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# RESEARCH MEMORANDUM

## STATIC STABILITY AND CONTROL OF CANARD CONFIGURATIONS AT MACH NUMBERS FROM 0.70 TO 2.22 - TRIANGULAR WING AND CANARD ON AN EXTENDED BODY

By John W. Boyd and Victor L. Peterson

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NATIONAL ADVISORY COMMITTEE
FOR AERONAUTICS

WASHINGTON
February 10, 1958

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# STATIC STABILITY AND CONTROL OF CANARD CONFIGURATIONS AT MACH NUMBERS FROM 0.70 TO 2.22 - TRIANGULAR WING AND CANARD ON AN EXTENDED BODY

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## SUMMARY

Results of an investigation of the static stability and control characteristics of a canard airplane configuration are presented without analysis for the Mach number range from 0.70 to 2.22. The configuration consisted of a triangular wing and triangular canard, both of aspect ratio 2.0, a low aspect ratio vertical tail, and a modified Sears-Haack body. The hinge line of the canard was in the extended wing chord plane, 1.79 wing mean aerodynamic chords ahead of the reference center of moments. The ratio of the area of the exposed canard panels to the total area of the wing was 6.9 percent. Data are presented for various combinations of the body, canard, wing, and vertical tail at $0^\circ$ and $5^\circ$ sideslip for an angle-of-attack range of $-6^\circ$ to $+18^\circ$. The canard deflection angles ranged from $0^\circ$ to $+20^\circ$.

## INTRODUCTION

The possible gains to be realized at supersonic speeds in the form of reduced trim drag and increased maneuverability by the use of canards rather than conventional tail-aft controls have resulted in increased interest in these arrangements. Therefore, an extensive research program aimed at determining the static longitudinal and directional characteristics of a number of canard configurations has been undertaken at the Ames Aeronautical Laboratory.

As a part of the program, tests were conducted to determine the effect of canard location on the aerodynamic characteristics of the configurations. This report is one of a series pertaining to the program and presents without analysis the longitudinal and directional characteristics for one complete configuration and its component parts, utilizing

an extended body in order to shift the canard forward. This configuration, which differed from that of reference 1 only in the body length and distance from the canard to the wing, consisted of a triangular wing and canard, both of aspect ratio 2.0, a low aspect ratio vertical tail, and a modified Sears-Haack body.

Results for the configuration utilizing the normal Sears-Haack body have been presented in reference 1.

## NOTATION

a.c. aerodynamic center determined at $C_L = 0$, percent $\bar{c}$.

$b$ wing span, ft

$\bar{c}$ mean aerodynamic chord of wing, ft

$\bar{c}_c$ mean aerodynamic chord of canard, ft

$c_c$ canard root chord, ft

$C_D$ drag coefficient, $\frac{\text{drag}}{qS}$

$C_{D_o}$ drag coefficient at zero lift

$C_L$ lift coefficient, $\frac{\text{lift}}{qS}$

$C_{L_\alpha}$ lift-curve slope taken through zero angle of attack, per deg

$C_m$ pitching-moment coefficient, $\frac{\text{pitching moment}}{qS\bar{c}}$, referred to projection of the $0.04\bar{c}$ point on the fuselage reference line (center of moments different from that of ref. 1)

$C_l$ rolling-moment coefficient, $\frac{\text{rolling moment}}{qSb}$

$C_n$ yawing-moment coefficient, $\frac{\text{yawing moment}}{qSb}$, referred to projection of the $0.04\bar{c}$ point on the fuselage reference line

$C_Y$ side-force coefficient, $\frac{\text{side force}}{qS}$

$\frac{\Delta C_l}{\beta}$ difference between rolling-moment coefficients at 5° and 0° sideslip divided by 5°, per deg

$\frac{\Delta C_n}{\beta}$ difference between yawing-moment coefficients at 5° and 0° sideslip divided by 5°, per deg

$\frac{\Delta C_Y}{\beta}$ difference between side-force coefficients at 5° and 0° sideslip divided by 5°, per deg

$C_{h_c}$ canard hinge-moment coefficient, $\frac{\text{canard hinge moment}}{qS_c(c_c/2)}$

$C_{Z_c}$ force coefficient normal to canard, $\frac{\text{normal force}}{qS}$

$\left(\frac{L}{D}\right)_{max}$ maximum lift-drag ratio

M free-stream Mach number

q free-stream dynamic pressure, lb/sq ft

S wing area formed by extending the leading and trailing edges to the plane of symmetry, sq ft

$S_c$ exposed canard area, sq ft

$\alpha$ angle of attack of wing root chord, deg

$\beta$ sideslip angle measured between the relative wind and vertical plane of symmetry, deg

$\delta$ angle of deflection of the canard with respect to the extended wing chord plane, positive when trailing edge is down, deg

Configurations are denoted by the following letters used in combination:

B body

C canard

V vertical tail

W wing

## APPARATUS AND MODEL

### Test Facility

The experimental data were obtained in the Ames 6- by 6-foot supersonic wind tunnel which is a closed-circuit variable-pressure type with a Mach number range continuous from 0.70 to 2.22. A recent modification involved perforating the test-section floor and ceiling and adding

a boundary-layer removal system to enable uniform flow to be maintained at transonic and low supersonic speeds. At the same time injector flaps were installed downstream of the test section to extend the upper Mach number limit by reducing the required compression ratio across the nozzle and by better matching the weight flow characteristics of the nozzle with those of the compressor.

Analysis of the results of an extensive survey of the modified wind-tunnel characteristics, although incomplete, is sufficiently complete to establish the validity of the results of the present investigation.

## Description of Model and Balances

The sting-mounted model consisted of an aspect ratio 2.0 triangular wing, an aspect ratio 2.0 all-movable triangular canard, and a low aspect ratio vertical tail, all mounted on a modified Sears-Haack body. The configuration differed from that of reference 1 only in the body length and distance between the canard and the wing. A cylindrical section was inserted in the Sears-Haack body between the wing and canard so that the canard was simply moved forward in the extended wing chord plane. (See fig. 1(a).) The canard hinge line ($0.35\bar{c}_c$) was 1.79 wing mean aerodynamic chords ahead of the reference center of moments ($0.04\bar{c}$). A dimensional sketch of the model is shown in figure 1(a). The wing and vertical tail had NACA 0003-63 sections streamwise and the constant thickness canard, detailed in figure 1(b), had beveled leading and trailing edges. The ratio of the area of the exposed canard panels to the total area of the wing was 6.9 percent and the ratio of the total areas was 12.9 percent. The wing, canard, and vertical tail were of solid steel construction to minimize aeroelastic effects. The surfaces were polished to give a smooth surface and further treated to prevent corrosion.

The fuselage was cut off as shown in figure 1(a) to accommodate the sting and the six-component strain-gage balance which measured forces and moments on the entire configuration. Canard normal forces and hinge moments were obtained from a two-component strain-gage balance mounted in the nose of the fuselage. The canard, wing, and vertical tail were removable, enabling data to be taken which would permit an evaluation of the contribution of each of the component parts of the model and the interference between them.

## TESTS AND PROCEDURES

### Range of Test Variables

For convenience, table I is presented showing the range of variables for each of the configurations tested. Mach numbers of 0.70, 0.90, 0.95,

1.00, 1.05, 1.10, 1.30, 1.50, 1.70, 1.90, and 2.22 and angles of attack ranging from -6° to +18° at 0° and 5° sideslip were covered in the investigation. The test Reynolds number based on the wing mean aerodynamic chord was 1.84 million at Mach numbers of 0.95, 1.00, 1.05, and 1.10, and 3.68 million at all other Mach numbers. The smaller Reynolds number was necessary at transonic speeds because of model structural limitations.

At the relatively low Reynolds numbers at which most wind tunnels operate, extensive regions of laminar flow can exist on models at zero lift. At lifting conditions the transition points on the wing, canard, and vertical tail usually move forward, thus causing a change in the friction drag with changing lift coefficient which is difficult to evaluate and, moreover, not necessarily representative of full scale. In order to induce transition at fixed locations on the component parts, a 0.010-inch-diameter wire was placed on the wing and 0.005-inch-diameter wires were affixed to the canard and vertical tail in the locations shown in figure 1(a). When the model was tested with the canard off, a 0.010-inch-diameter wire was located on the body 4 inches from the nose. The wire sizes were selected on the basis of the results of reference 2. Although there is no conclusive evidence as to the magnitude of the form drag increment contributed by the transition wires, previous studies have indicated this increment to be not more than 0.0010. All of the data presented herein are for transition-fixed conditions.

## Reduction of Data

The data presented herein have been reduced to standard NACA coefficient form. Rolling-moment, side-force, yawing-moment, and pitching-moment coefficients were computed about the body axes. Lift and drag coefficients were referred to the wind axes. The pitching-moment and yawing-moment coefficients were referred to the 0.04 point of the wing mean aerodynamic chord. This location was chosen to give a minimum static margin of $0.03\bar{c}$ in the range of trim lift coefficients between 0 and 0.5 throughout the Mach number range investigated. It should be noted that this requirement resulted in a center-of-moment location that was different from that of reference 1. The canard hinge moments were computed about a hinge line located at the 0.35 point of the canard mean aerodynamic chord. Factors which affect the accuracy of the results are discussed in the following paragraphs.

Stream variations.- Surveys of the stream characteristics of the Ames 6- by 6-foot supersonic wind tunnel showed that in the region of the test section, essentially no stream curvature existed in the pitch plane of the model and that the axial static-pressure variations were usually less than ±1 percent of the dynamic pressure. The static-pressure variation resulted in negligible longitudinal-buoyancy corrections to the drag of this model. Therefore, no corrections for stream curvature or static-pressure variation were made in the present investigation.

The results of these surveys also showed that a stream angle existed in the vertical plane along the tunnel center line. Similar results showing a stream angle of less than $\pm 0.3^\circ$ throughout the Mach number range were obtained from tests of the model mounted in a horizontal position on the tunnel center line ($\beta = 0^\circ$) and pitched in the vertical plane. No data were available from stream surveys or model tests to determine the lateral deviations of the stream; however, they also are believed to be small in view of the small deviations from a uniform stream measured in the vertical plane. Therefore, the data at $0^\circ$ sideslip which were obtained with the model mounted in the horizontal position could only be corrected for the stream angles in the pitch plane. Since the data of primary interest at these conditions, and particularly the drag, are sensitive to stream angle changes in the pitch plane, it was considered necessary to make these corrections. On the other hand lift, drag, and pitching-moment characteristics do not vary appreciably with yaw angles so that these coefficients would only be slightly affected if small stream angles existed in the yaw plane.

The results at a constant sideslip angle of $5^\circ$ were obtained by mounting the model in a horizontal position on a sting bent off the tunnel center line and again pitching in the vertical plane. Results were not available which would permit stream angle corrections in either the pitch or yaw planes to be applied to these data. However, the lateral-directional characteristics which are of primary interest at these test conditions, would not be appreciably affected by the existence of small stream angles in either the pitch or yaw planes.

Support interference.- The effects of model support interference on the aerodynamic characteristics were considered to consist primarily of a change in the pressure at the base of the model. However, the drag data presented herein contain no base drag component since the base pressure was measured and the drag was adjusted to correspond to that for which the base pressure is equal to the free-stream static pressure. Therefore, no corrections were made to take into account support interference.

Tunnel-wall interference.- The effectiveness of the perforations in the wind-tunnel test section in preventing choking and absorbing reflected disturbances at transonic and low supersonic speeds has been established experimentally. Unpublished data from the wind-tunnel calibration indicate that reliable data can be obtained throughout the Mach number range if certain restrictions are imposed on the model size and attitude. The configurations and methods of testing used in the present investigation conform to these restrictions so that the data at transonic and low supersonic speeds are reasonably free of interference effects. Thus, no corrections for wall interference have been made.

## RESULTS

The results in this report are presented without analysis in order to expedite publication. All of the experimental data are presented in tables II through V. An index to these tabulated results is presented in table I. Selected portions of the data are presented in figures 2 through 7.

Figure 2 shows the lift, drag, and pitching-moment characteristics with the canard on and deflected and with the canard off for several test Mach numbers. Variations of canard normal force and hinge-moment coefficients as a function of angle of attack at constant canard deflection angles are presented in figure 3. Summarized in figure 4 are the maximum lift-drag ratios, lift-curve slopes, minimum drag coefficients, and aerodynamic centers as a function of Mach number for the canard on at zero deflection and for the canard off.

The results of figure 5 show the effect of configuration changes on the rolling-moment, side-force, and yawing-moment coefficients as a function of angle of attack at constant sideslip angles. The effects of deflecting the canard on the lateral-directional characteristics are presented in figure 6 as a function of angle of attack at constant angles of sideslip. Summarized in figure 7 are $\Delta C_l/\beta$, $\Delta C_Y/\beta$, and $\Delta C_n/\beta$ as a function of Mach number at constant angles of attack of $0^\circ$, $10^\circ$, and $18^\circ$ for the canard on at zero deflection and for the canard off.

Ames Aeronautical Laboratory
National Advisory Committee for Aeronautics
Moffett Field, Calif., Nov. 14, 1957

## REFERENCES

1. Boyd, John W., and Peterson, Victor L.: Static Stability and Control of Canard Configurations at Mach Numbers From 0.70 to 2.22 - Longitudinal Characteristics of a Triangular Wing and Canard. NACA RM A57J15, 1957.

2. Winter, K. G., Scott-Wilson, J. B., and Davies, F. V.: Methods of Determination and of Fixing Boundary-Layer Transition on Wind Tunnel Models at Supersonic Speeds. R.A.E. TN Aero. 2341, British, Sept. 1954.

TABLE I.- RANGE OF VARIABLES FOR CONFIGURATIONS TESTED

| Configuration | $\delta$, deg | $\beta$, deg | Tabulated data, table no. |
|---|---|---|---|
| BVW | | 0 and 5 | II(a), III(a) |
| BVWC | 0 | 0 and 5 | II(b), III(b) |
| BVWC | 2.5 | 0 | II(c) |
| BVWC | 5.2 | 0 | II(d) |
| BVWC | 9.7 | 0 and 5 | II(e), III(c) |
| BVWC | 19.5 | 0 | II(f) |
| BWC | 0 | 5 | III(d) |
| BWC | 9.7 | 5 | III(e) |
| BW | | 5 | III(f) |
| BV | | 0 and 5 | IV(a), V(a) |
| BVC | 0.2 | 0 and 5 | IV(b), V(b) |
| BVC | 4.5 | 0 | IV(c) |
| BVC | 9.8, 10.2 | 0 and 5 | IV(d), V(c) |
| BVC | 19.8 | 0 | IV(e) |
| BC | 0.2 | 5 | V(d) |
| BC | 9.6 | 5 | V(e) |
| B | | 5 | V(f) |

TABLE II.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 0^{\circ}$

(a) BVW

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -0.64 | -0.321 | .0435 | .1084 | .0008 | -0.004 | .0022 |
| | -0.43 | -0.203 | .0237 | .0686 | .0009 | -0.004 | .0019 |
| | -0.23 | -0.104 | .0145 | .0354 | .0008 | -0.003 | .0014 |
| | -0.08 | -0.043 | .0120 | .0179 | .0001 | -0.001 | .0007 |
| | -0.03 | -0.017 | .0115 | .0101 | -.0000 | -0.001 | .0005 |
| | 0.002 | -0.001 | .0115 | .0055 | -.0000 | -0.001 | .0005 |
| | 0.017 | 0.062 | .0121 | -.0138 | .0001 | -0.000 | .0003 |
| | 0.037 | 0.157 | .0190 | -.0456 | .0000 | -0.001 | .0002 |
| | 0.057 | 0.263 | .0327 | -.0798 | .0001 | -0.001 | .0002 |
| | 0.078 | 0.377 | .0560 | -.1180 | .0001 | -0.000 | -.0000 |
| | 0.097 | 0.482 | .0844 | -.1510 | .0001 | -0.001 | -.0001 |
| | 0.117 | 0.599 | .1241 | -.1885 | .0001 | -0.000 | -.0002 |
| | 0.137 | 0.716 | .1721 | -.2260 | .0000 | -0.000 | -.0002 |
| | 0.158 | 0.837 | .2315 | -.2622 | -.0001 | .0001 | .0002 |
| | 0.177 | 0.940 | .2927 | -.2922 | -.0001 | .0001 | .0015 |
| 0.90 | -0.62 | -0.337 | .0446 | .1272 | .0009 | -0.004 | .0021 |
| | -0.42 | -0.215 | .0248 | .0802 | .0010 | -0.003 | .0016 |
| | -0.21 | -0.104 | .0144 | .0394 | .0006 | -0.002 | .0010 |
| | -0.06 | -0.037 | .0118 | .0176 | .0001 | -0.001 | .0004 |
| | -0.01 | -0.013 | .0118 | .0100 | -.0001 | -0.001 | .0003 |
| | 0.003 | 0.003 | .0119 | .0047 | -.0001 | -0.000 | .0002 |
| | 0.020 | 0.080 | .0130 | -.0216 | .0000 | -0.001 | .0003 |
| | 0.039 | 0.186 | .0212 | -.0607 | -.0000 | -0.001 | .0002 |
| | 0.059 | 0.305 | .0388 | -.1062 | -.0000 | -0.001 | .0002 |
| | 0.080 | 0.427 | .0658 | -.1532 | .0000 | -0.001 | .0002 |
| | 0.099 | 0.550 | .1007 | -.2028 | -.0000 | -0.002 | .0002 |
| | 0.120 | 0.684 | .1487 | -.2606 | .0001 | -0.001 | .0002 |
| | 0.139 | 0.815 | .2047 | -.3212 | .0001 | -0.002 | .0005 |
| | 0.159 | 0.942 | .2708 | -.3775 | -.0002 | -0.002 | .0009 |
| | 0.178 | 1.031 | .3313 | -.4077 | .0024 | -0.004 | .0029 |
| 0.95 | -0.59 | -0.361 | .0511 | .1536 | .0007 | -0.006 | .0024 |
| | -0.40 | -0.236 | .0292 | .0995 | .0009 | -0.005 | .0021 |
| | -0.19 | -0.116 | .0172 | .0504 | .0003 | -0.004 | .0014 |
| | -0.04 | -0.037 | .0159 | .0207 | -.0001 | -0.003 | .0010 |
| | 0.001 | -0.018 | .0132 | .0114 | -.0002 | -0.001 | .0007 |
| | 0.005 | 0.007 | .0137 | .0035 | -.0001 | -0.002 | .0007 |
| | 0.022 | 0.099 | .0164 | -.0331 | -.0001 | -0.002 | .0008 |
| | 0.041 | 0.219 | .0269 | -.0840 | .0000 | -0.002 | .0007 |
| | 0.061 | 0.346 | .0482 | -.1400 | -.0001 | -0.002 | .0007 |
| | 0.081 | 0.467 | .0762 | -.1914 | -.0000 | -0.002 | .0006 |
| | 0.101 | 0.586 | .1135 | -.2433 | -.0000 | -0.003 | .0007 |
| | 0.121 | 0.709 | .1614 | -.2964 | .0001 | -0.002 | .0007 |
| | 0.141 | 0.823 | .2143 | -.3450 | .0001 | -0.003 | .0009 |
| | 0.161 | 0.940 | .2775 | -.3949 | -.0001 | -0.003 | .0011 |
| | 0.181 | 1.042 | .3450 | -.4382 | -.0007 | -0.003 | .0025 |
| 1.00 | -0.59 | -0.353 | .0530 | .1566 | .0006 | -0.005 | .0021 |
| | -0.38 | -0.225 | .0311 | .1008 | .0005 | -0.004 | .0018 |
| | -0.18 | -0.105 | .0225 | .0474 | .0006 | -0.003 | .0015 |
| | -0.03 | -0.028 | .0189 | .0154 | -.0001 | -0.002 | .0009 |
| | 0.003 | -0.003 | .0170 | .0044 | -.0002 | -0.001 | .0006 |
| | 0.007 | 0.021 | .0188 | -.0052 | -.0002 | -0.002 | .0007 |
| | 0.022 | 0.165 | .0205 | -.0410 | -.0002 | -0.001 | .0007 |
| | 0.042 | 0.282 | .0315 | -.0932 | -.0001 | -0.002 | .0006 |
| | 0.062 | 0.337 | .0504 | -.1430 | -.0001 | -0.002 | .0007 |
| | 0.083 | 0.469 | .0817 | -.2005 | -.0001 | -0.002 | .0008 |
| | 0.102 | 0.577 | .1154 | -.2460 | -.0001 | -0.002 | .0009 |
| | 0.122 | 0.687 | .1598 | -.2918 | .0001 | -0.003 | .0008 |
| | 0.142 | 0.791 | .2099 | -.3349 | .0001 | -0.003 | .0008 |
| | 0.163 | 0.903 | .2706 | -.3810 | -.0001 | -0.003 | .0013 |
| | 0.182 | 1.000 | .3343 | -.4202 | -.0005 | -0.002 | .0021 |
| 1.05 | -0.60 | -0.348 | .0505 | .1453 | .0004 | -0.004 | .0018 |
| | -0.40 | -0.239 | .0280 | .1053 | .0005 | -0.003 | .0015 |
| | -0.18 | -0.109 | .0202 | .0473 | .0004 | -0.003 | .0013 |
| | -0.04 | -0.021 | .0183 | .0068 | -.0000 | -0.001 | .0006 |
| | 0.002 | -0.005 | .0171 | .0065 | .0000 | -0.001 | .0004 |
| | 0.006 | 0.003 | .0171 | .0062 | -.0002 | -0.001 | .0006 |
| | 0.022 | 0.094 | .0192 | -.0351 | -.0000 | -0.001 | .0005 |
| | 0.042 | 0.205 | .0282 | -.0895 | -.0001 | -0.001 | .0006 |
| | 0.061 | 0.331 | .0479 | -.1363 | .0000 | -0.002 | .0007 |
| | 0.082 | 0.443 | .0782 | -.1885 | -.0000 | -0.002 | .0008 |
| | 0.101 | 0.544 | .1094 | -.2305 | .0000 | -0.002 | .0008 |
| | 0.122 | 0.668 | .1567 | -.2847 | .0001 | -0.003 | .0011 |
| | 0.141 | 0.760 | .2019 | -.3229 | .0001 | -0.003 | .0013 |
| | 0.162 | 0.868 | .2609 | -.3678 | -.0000 | -0.003 | .0012 |
| | 0.182 | 0.961 | .3232 | -.4049 | -.0004 | -0.003 | .0023 |
| 1.10 | -0.61 | -0.353 | .0522 | .1622 | .0008 | -0.003 | .0011 |
| | -0.40 | -0.233 | .0319 | .1126 | .0007 | -0.003 | .0008 |
| | -0.19 | -0.111 | .0205 | .0571 | .0006 | -0.001 | .0001 |
| | -0.05 | -0.038 | .0176 | .0242 | .0004 | -0.001 | .0005 |
| | 0.001 | -0.016 | .0173 | .0152 | .0001 | .0001 | -.0002 |
| | 0.006 | 0.008 | .0179 | .0050 | -.0002 | .0001 | -.0004 |
| | 0.021 | 0.083 | .0195 | -.0259 | -.0002 | -0.000 | -.0001 |
| | 0.041 | 0.196 | .0286 | -.0788 | -.0002 | -0.001 | .0005 |
| | 0.061 | 0.320 | .0466 | -.1387 | -.0000 | -0.002 | .0008 |
| | 0.081 | 0.443 | .0731 | -.1917 | -.0001 | -0.002 | .0009 |
| | 0.101 | 0.559 | .1074 | -.2407 | .0000 | -0.001 | .0004 |
| | 0.121 | 0.644 | .1471 | -.2653 | .0002 | -0.002 | .0008 |
| | 0.141 | 0.789 | .1915 | -.3047 | .0002 | -0.002 | .0009 |
| | 0.161 | 0.833 | .2489 | -.3527 | .0000 | -0.003 | .0014 |
| | 0.181 | 0.927 | .3092 | -.3893 | -.0001 | -0.003 | .0018 |

TABLE II.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 0^{\circ}$ - Continued
(a) BVW - Concluded

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 1.30 | -0.61 | -0.292 | .0430 | .1290 | .0007 | -0.000 | .0003 |
| | -0.40 | -0.190 | .0268 | .0844 | .0007 | 0.001 | -.0002 |
| | -0.20 | -0.094 | .0178 | .0417 | .0007 | 0.002 | -.0005 |
| | -0.06 | -0.030 | .0154 | .0146 | .0004 | 0.003 | -.0007 |
| | -0.01 | -0.007 | .0152 | .0057 | .0002 | 0.003 | -.0009 |
| | 0.04 | 0.013 | .0153 | -.0027 | .0002 | 0.003 | -.0009 |
| | 0.20 | 0.081 | .0169 | -.0313 | .0001 | 0.002 | -.0007 |
| | 0.40 | 0.178 | .0251 | -.0738 | .0002 | 0.002 | -.0008 |
| | 0.60 | 0.275 | .0402 | -.1162 | .0002 | 0.001 | -.0004 |
| | 0.80 | 0.371 | .0622 | -.1571 | .0001 | 0.001 | -.0002 |
| | 1.00 | 0.466 | .0907 | -.1975 | .0002 | 0.000 | -.0001 |
| | 1.20 | 0.559 | .1270 | -.2359 | .0001 | 0.001 | -.0000 |
| | 1.40 | 0.647 | .1675 | -.2716 | .0000 | 0.000 | .0000 |
| | 1.60 | 0.741 | .2170 | -.3080 | .0001 | -0.000 | .0001 |
| | 1.80 | 0.826 | .2704 | -.3376 | .0001 | -0.001 | .0004 |
| 1.50 | -0.63 | -0.268 | .0425 | .1168 | .0005 | 0.001 | -.0003 |
| | -0.41 | -0.177 | .0264 | .0769 | .0004 | 0.001 | -.0004 |
| | -0.21 | -0.087 | .0180 | .0378 | .0004 | 0.002 | -.0007 |
| | -0.06 | -0.027 | .0156 | .0125 | .0003 | 0.002 | -.0009 |
| | -0.01 | -0.006 | .0153 | .0041 | .0001 | 0.002 | -.0009 |
| | 0.04 | 0.012 | .0155 | -.0039 | .0001 | 0.002 | -.0009 |
| | 0.19 | 0.075 | .0172 | -.0303 | .0000 | 0.002 | -.0009 |
| | 0.38 | 0.159 | .0239 | -.0673 | -.0000 | 0.002 | -.0009 |
| | 0.59 | 0.243 | .0370 | -.1030 | .0000 | 0.001 | -.0008 |
| | 0.80 | 0.332 | .0577 | -.1400 | .0001 | 0.001 | -.0007 |
| | 0.99 | 0.410 | .0819 | -.1721 | .0001 | 0.001 | -.0007 |
| | 1.18 | 0.490 | .1117 | -.2030 | .0002 | 0.001 | -.0005 |
| | 1.39 | 0.568 | .1482 | -.2319 | .0002 | 0.000 | -.0003 |
| | 1.59 | 0.646 | .1904 | -.2576 | .0002 | 0.000 | -.0001 |
| | 1.79 | 0.718 | .2362 | -.2766 | .0000 | 0.000 | .0002 |
| 1.70 | -0.63 | -0.242 | .0398 | .1013 | .0003 | 0.000 | .0000 |
| | -0.42 | -0.162 | .0258 | .0688 | .0004 | 0.001 | -.0002 |
| | -0.22 | -0.082 | .0178 | .0352 | .0004 | 0.001 | -.0004 |
| | -0.07 | -0.029 | .0151 | .0129 | .0002 | 0.001 | -.0005 |
| | -0.02 | -0.009 | .0151 | .0055 | .0001 | 0.001 | -.0005 |
| | 0.03 | 0.009 | .0150 | -.0022 | .0000 | 0.002 | -.0005 |
| | 0.19 | 0.069 | .0167 | -.0266 | -.0001 | 0.001 | -.0004 |
| | 0.38 | 0.141 | .0227 | -.0565 | -.0000 | 0.001 | -.0003 |
| | 0.58 | 0.215 | .0344 | -.0871 | -.0000 | 0.001 | -.0002 |
| | 0.79 | 0.289 | .0517 | -.1164 | .0000 | 0.000 | -.0001 |
| | 0.99 | 0.363 | .0742 | -.1448 | .0000 | 0.000 | -.0002 |
| | 1.18 | 0.429 | .0999 | -.1679 | -.0001 | -0.000 | -.0001 |
| | 1.39 | 0.499 | .1322 | -.1899 | -.0001 | -0.000 | .0000 |
| | 1.58 | 0.569 | .1687 | -.2075 | -.0002 | 0.000 | .0003 |
| | 1.78 | 0.636 | .2107 | -.2201 | -.0002 | 0.001 | .0001 |
| 1.90 | -0.61 | -0.214 | .0359 | .0868 | .0002 | -0.000 | .0001 |
| | -0.41 | -0.142 | .0236 | .0586 | .0002 | 0.000 | -.0001 |
| | -0.19 | -0.068 | .0164 | .0293 | .0002 | 0.001 | -.0003 |
| | -0.05 | -0.021 | .0145 | .0108 | .0001 | 0.001 | -.0003 |
| | -0.00 | -0.005 | .0143 | .0046 | -.0001 | 0.001 | -.0003 |
| | 0.05 | 0.018 | .0144 | -.0022 | -.0001 | 0.001 | -.0004 |
| | 0.20 | 0.066 | .0160 | -.0236 | -.0001 | 0.000 | -.0002 |
| | 0.40 | 0.134 | .0219 | -.0505 | -.0001 | 0.000 | -.0002 |
| | 0.59 | 0.199 | .0327 | -.0759 | -.0000 | 0.000 | -.0001 |
| | 0.80 | 0.267 | .0490 | -.1016 | -.0001 | -0.000 | -.0001 |
| | 1.00 | 0.331 | .0692 | -.1239 | .0000 | -0.000 | -.0001 |
| | 1.20 | 0.394 | .0936 | -.1435 | .0001 | -0.001 | -.0003 |
| | 1.40 | 0.456 | .1226 | -.1594 | .0002 | -0.000 | -.0005 |
| | 1.60 | 0.521 | .1576 | -.1715 | .0002 | -0.001 | -.0005 |
| | 1.80 | 0.581 | .1954 | -.1824 | -.0001 | 0.000 | -.0005 |
| 2.22 | -0.58 | -0.177 | .0309 | .0675 | .0001 | -0.001 | .0002 |
| | -0.37 | -0.116 | .0209 | .0446 | .0001 | -0.001 | .0000 |
| | -0.17 | -0.053 | .0152 | .0218 | .0001 | -0.000 | -.0001 |
| | -0.02 | -0.010 | .0137 | .0049 | -.0000 | 0.000 | -.0003 |
| | 0.03 | 0.008 | .0136 | -.0020 | -.0001 | -0.000 | -.0003 |
| | 0.08 | 0.022 | .0138 | -.0071 | -.0001 | -0.000 | -.0002 |
| | 0.23 | 0.068 | .0160 | -.0248 | -.0002 | 0.001 | -.0003 |
| | 0.42 | 0.126 | .0219 | -.0463 | -.0001 | 0.000 | -.0002 |
| | 0.63 | 0.184 | .0323 | -.0674 | -.0001 | 0.000 | -.0002 |
| | 0.83 | 0.243 | .0468 | -.0868 | -.0001 | -0.000 | -.0002 |
| | 1.03 | 0.299 | .0648 | -.1029 | -.0001 | -0.000 | -.0004 |
| | 1.23 | 0.357 | .0875 | -.1167 | -.0000 | -0.001 | -.0005 |
| | 1.43 | 0.414 | .1149 | -.1278 | -.0000 | -0.001 | -.0007 |
| | 1.63 | 0.476 | .1474 | -.1387 | -.0001 | -0.001 | -.0006 |
| | 1.82 | 0.529 | .1817 | -.1471 | -.0001 | -0.001 | -.0007 |

TABLE II.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 0^{\circ}$ - Continued
(b) BVWC; $\delta = 0^{\circ}$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ | $C_{Z_c}$ | $C_{h_c}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.70 | -.063 | -.0329 | .0457 | .0520 | .0005 | -.0004 | .0020 | -.0253 | .0672 |
| | -.023 | -.0108 | .0158 | .0212 | .0007 | -.0002 | .0013 | -.0069 | .0198 |
| | -.008 | -.0043 | .0133 | .0137 | .0002 | -.0001 | .0009 | -.0013 | .0028 |
| | -.003 | -.0022 | .0134 | .0106 | .0000 | -.0001 | .0008 | .0000 | -.0010 |
| | .0002 | -.0001 | .0124 | .0085 | .0001 | -.0001 | .0008 | .0018 | -.0064 |
| | .0017 | .0063 | .0138 | .0010 | .0002 | -.0001 | .0004 | .0073 | -.0239 |
| | .0037 | .0163 | .0206 | -.0135 | .0001 | .0000 | .0002 | .0156 | -.0441 |
| | .0057 | .0269 | .0352 | -.0268 | .0002 | .0000 | .0000 | .0246 | -.0671 |
| | .0077 | .0384 | .0592 | -.0416 | .0001 | .0002 | -.0006 | .0343 | -.0907 |
| | .0097 | .0499 | .0905 | -.0538 | .0000 | .0002 | -.0010 | .0439 | -.1131 |
| | .0117 | .0617 | .1313 | -.0668 | .0001 | .0004 | -.0020 | .0537 | -.1353 |
| | .0137 | .0768 | .1886 | -.0838 | .0001 | .0005 | -.0019 | .0667 | -.1645 |
| | .0157 | .0864 | .2422 | -.0918 | .0001 | .0006 | -.0028 | .0761 | -.1807 |
| | .0178 | .0983 | .3122 | -.1033 | .0006 | .0008 | -.0045 | .0861 | -.1999 |
| 0.90 | -.061 | -.0338 | .0462 | .0669 | .0004 | -.0003 | .0018 | -.0258 | .0852 |
| | -.041 | -.0217 | .0268 | .0447 | .0007 | -.0003 | .0017 | -.0156 | .0509 |
| | -.021 | -.0110 | .0165 | .0262 | .0005 | -.0002 | .0012 | -.0068 | .0230 |
| | -.006 | -.0039 | .0133 | .0152 | .0001 | -.0001 | .0007 | -.0013 | .0038 |
| | -.000 | -.0015 | .0132 | .0112 | -.0000 | -.0001 | .0006 | .0007 | -.0032 |
| | .0004 | .0004 | .0131 | .0077 | -.0000 | -.0000 | .0005 | .0022 | -.0086 |
| | .0019 | .0077 | .0146 | -.0037 | .0001 | -.0000 | .0003 | .0083 | -.0296 |
| | .0040 | .0188 | .0234 | -.0239 | .0001 | -.0000 | .0001 | .0173 | -.0583 |
| | .0059 | .0308 | .0412 | -.0464 | .0001 | .0001 | -.0003 | .0267 | -.0893 |
| | .0079 | .0432 | .0684 | -.0692 | .0000 | .0000 | -.0005 | .0364 | -.1188 |
| | .0099 | .0562 | .1053 | -.0957 | -.0000 | .0002 | -.0010 | .0463 | -.1502 |
| | .0118 | .0696 | .1523 | -.1279 | -.0002 | .0002 | -.0020 | .0556 | -.1823 |
| | .0140 | .0835 | .2127 | -.1594 | -.0001 | .0003 | -.0012 | .0665 | -.2216 |
| | .0159 | .0960 | .2779 | -.1900 | .0001 | .0004 | -.0021 | .0759 | -.2456 |
| | .0180 | .1084 | .3563 | -.2212 | .0007 | .0006 | -.0038 | .0851 | -.2781 |
| 0.95 | -.059 | -.0362 | .0525 | .0938 | .0004 | -.0004 | .0022 | -.0250 | .0859 |
| | -.039 | -.0243 | .0331 | .0664 | .0005 | -.0004 | .0022 | -.0155 | .0513 |
| | -.019 | -.0124 | .0203 | .0373 | .0002 | -.0003 | .0015 | -.0065 | .0215 |
| | -.004 | -.0044 | .0161 | .0195 | -.0001 | -.0002 | .0013 | -.0007 | -.0000 |
| | .0003 | -.0016 | .0160 | .0125 | -.0001 | -.0001 | .0010 | .0005 | -.0047 |
| | .0006 | .0009 | .0159 | .0067 | .0000 | -.0001 | .0010 | .0017 | -.0090 |
| | .0021 | .0090 | .0179 | -.0131 | -.0000 | -.0002 | .0009 | .0085 | -.0327 |
| | .0043 | .0217 | .0303 | -.0451 | -.0000 | -.0001 | .0007 | .0174 | -.0623 |
| | .0061 | .0339 | .0504 | -.0747 | .0000 | -.0001 | .0005 | .0266 | -.0929 |
| | .0081 | .0467 | .0795 | -.1038 | .0001 | -.0001 | .0002 | .0365 | -.1286 |
| | .0101 | .0593 | .1187 | -.1316 | .0001 | -.0001 | -.0002 | .0465 | -.1660 |
| | .0121 | .0718 | .1661 | -.1583 | .0001 | .0003 | -.0012 | .0561 | -.2010 |
| | .0141 | .0841 | .2235 | -.1849 | .0001 | .0003 | -.0013 | .0668 | -.2410 |
| | .0161 | .0968 | .2908 | -.2126 | .0001 | .0004 | -.0016 | .0759 | -.2716 |
| | .0181 | .1076 | .3624 | -.2335 | .0006 | .0005 | -.0029 | .0844 | -.2996 |
| 1.00 | -.057 | -.0346 | .0529 | .0962 | .0003 | -.0003 | .0017 | -.0233 | .0799 |
| | -.038 | -.0229 | .0337 | .0656 | .0003 | -.0003 | .0017 | -.0150 | .0524 |
| | -.002 | -.0030 | .0210 | .0131 | -.0001 | -.0001 | .0008 | -.0007 | -.0000 |
| | .0003 | .0000 | .0207 | .0048 | -.0002 | -.0001 | .0006 | .0011 | -.0068 |
| | .0008 | .0022 | .0203 | -.0002 | -.0001 | -.0001 | .0006 | .0027 | -.0122 |
| | .0022 | .0105 | .0235 | -.0234 | -.0001 | -.0001 | .0007 | .0086 | -.0340 |
| | .0043 | .0223 | .0348 | -.0546 | -.0000 | -.0001 | .0005 | .0178 | -.0646 |
| | .0063 | .0342 | .0540 | -.0840 | .0000 | -.0000 | .0003 | .0259 | -.0903 |
| | .0082 | .0461 | .0819 | -.1121 | .0000 | -.0001 | .0002 | .0350 | -.1233 |
| | .0102 | .0583 | .1196 | -.1375 | .0000 | -.0001 | -.0003 | .0448 | -.1587 |
| | .0123 | .0698 | .1647 | -.1604 | .0001 | .0002 | -.0009 | .0542 | -.1941 |
| | .0143 | .0814 | .2206 | -.1830 | .0002 | .0003 | -.0012 | .0640 | -.2324 |
| | .0163 | .0922 | .2795 | -.2023 | .0001 | .0004 | -.0013 | .0733 | -.2635 |
| | .0183 | .1022 | .3470 | -.2213 | .0008 | .0005 | -.0029 | .0811 | -.2905 |
| 1.05 | -.058 | -.0343 | .0523 | .0861 | .0001 | -.0003 | .0016 | -.0239 | .0817 |
| | -.038 | -.0215 | .0328 | .0554 | .0003 | -.0003 | .0016 | -.0148 | .0518 |
| | -.018 | -.0111 | .0229 | .0307 | .0001 | -.0002 | .0014 | -.0062 | .0215 |
| | -.003 | -.0024 | .0209 | .0052 | -.0001 | -.0001 | .0008 | -.0006 | -.0016 |
| | .0002 | .0004 | .0210 | -.0011 | -.0001 | -.0001 | .0008 | .0011 | -.0065 |
| | .0007 | .0024 | .0210 | -.0065 | -.0001 | -.0001 | .0008 | .0020 | -.0097 |
| | .0022 | .0097 | .0237 | -.0233 | -.0000 | -.0000 | .0004 | .0074 | -.0297 |
| | .0042 | .0205 | .0317 | -.0477 | .0000 | -.0000 | .0004 | .0162 | -.0592 |
| | .0061 | .0315 | .0508 | -.0736 | .0000 | -.0001 | .0005 | .0240 | -.0832 |
| | .0082 | .0435 | .0791 | -.1010 | .0000 | -.0001 | .0008 | .0328 | -.1143 |
| | .0101 | .0546 | .1126 | -.1264 | .0001 | -.0001 | -.0001 | .0424 | -.1494 |
| | .0122 | .0673 | .1607 | -.1572 | .0003 | .0003 | -.0014 | .0517 | -.1878 |
| | .0142 | .0784 | .2128 | -.1777 | .0003 | .0003 | -.0014 | .0620 | -.2249 |
| | .0162 | .0881 | .2703 | -.1959 | .0002 | .0005 | -.0013 | .0700 | -.2528 |
| | .0182 | .0977 | .3331 | -.2131 | .0009 | .0005 | -.0030 | .0777 | -.2799 |
| 1.10 | -.059 | -.0348 | .0529 | .1068 | .0005 | -.0002 | .0010 | -.0224 | .0793 |
| | -.039 | -.0230 | .0341 | .0747 | .0005 | -.0002 | .0007 | -.0144 | .0536 |
| | -.019 | -.0114 | .0234 | .0416 | .0004 | -.0000 | .0003 | -.0057 | .0214 |
| | -.004 | -.0039 | .0211 | .0209 | .0003 | -.0001 | .0008 | -.0009 | .0019 |
| | .0002 | -.0007 | .0199 | .0098 | .0001 | -.0001 | .0006 | .0003 | -.0010 |
| | .0006 | .0010 | .0205 | .0055 | -.0002 | .0001 | .0001 | .0019 | -.0078 |
| | .0021 | .0080 | .0223 | -.0116 | -.0001 | .0001 | -.0000 | .0079 | -.0305 |
| | .0041 | .0190 | .0313 | -.0387 | .0000 | .0001 | -.0002 | .0165 | -.0614 |
| | .0061 | .0307 | .0491 | -.0702 | -.0000 | .0000 | -.0001 | .0246 | -.0855 |
| | .0081 | .0445 | .0779 | -.1155 | .0000 | .0001 | -.0002 | .0330 | -.1127 |
| | .0101 | .0557 | .1122 | -.1367 | .0000 | .0000 | -.0005 | .0425 | -.1518 |
| | .0121 | .0667 | .1554 | -.1553 | .0003 | .0002 | -.0010 | .0505 | -.1762 |
| | .0142 | .0755 | .2030 | -.1617 | .0002 | .0003 | -.0016 | .0586 | -.2044 |
| | .0161 | .0837 | .2554 | -.1828 | .0003 | .0004 | -.0016 | .0665 | -.2336 |
| | .0181 | .0941 | .3220 | -.2074 | .0010 | .0005 | -.0034 | .0744 | -.2666 |

TABLE II.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 0^\circ$ - Continued
(b) BVWC; $\delta = 0^\circ$ - Concluded

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ | $C_{z_c}$ | $C_{n_c}$ |
|---|---|---|---|---|---|---|---|---|---|
| 1.30 | -06.0 | -0.296 | .0443 | .0775 | .0003 | -0.001 | .0006 | -.0217 | .0855 |
| | -04.0 | -0.193 | .0283 | .0520 | .0004 | -0.000 | .0003 | -.0141 | .0566 |
| | -02.0 | -0.095 | .0194 | .0269 | .0005 | 0.001 | -.0001 | -.0066 | .0289 |
| | -00.5 | -0.028 | .0168 | .0100 | .0004 | 0.001 | -.0002 | -.0014 | .0073 |
| | -00.0 | -0.008 | .0164 | .0055 | .0002 | 0.002 | -.0005 | -.0001 | .0018 |
| | 00.5 | 0.013 | .0165 | -.0005 | .0001 | 0.001 | -.0005 | .0014 | -.0056 |
| | 02.0 | 0.081 | .0187 | -.0173 | .0001 | 0.001 | -.0005 | .0065 | -.0250 |
| | 04.0 | 0.180 | .0271 | -.0407 | .0001 | 0.001 | -.0005 | .0145 | -.0571 |
| | 06.0 | 0.276 | .0425 | -.0628 | .0001 | 0.001 | -.0004 | .0225 | -.0878 |
| | 08.0 | 0.375 | .0647 | -.0845 | .0000 | 0.001 | -.0003 | .0304 | -.1164 |
| | 10.0 | 0.476 | .0946 | -.1083 | -.0001 | 0.001 | -.0005 | .0377 | -.1426 |
| | 12.0 | 0.585 | .1340 | -.1349 | -.0001 | 0.001 | -.0008 | .0457 | -.1707 |
| | 14.1 | 0.688 | .1808 | -.1610 | .0000 | 0.000 | -.0013 | .0532 | -.1978 |
| | 16.0 | 0.782 | .2314 | -.1799 | .0003 | 0.001 | -.0008 | .0601 | -.2210 |
| | 18.0 | 0.866 | .2874 | -.1926 | .0009 | 0.001 | -.0021 | .0666 | -.2450 |
| 1.50 | -06.0 | -0.262 | .0424 | .0618 | .0002 | -0.000 | -.0001 | -.0205 | .0797 |
| | -04.1 | -0.180 | .0283 | .0434 | .0002 | 0.000 | -.0002 | -.0136 | .0543 |
| | -02.1 | -0.098 | .0199 | .0237 | .0003 | 0.001 | -.0004 | -.0065 | .0257 |
| | -00.6 | -0.030 | .0173 | .0093 | .0002 | 0.001 | -.0004 | -.0015 | .0058 |
| | -00.1 | -0.010 | .0170 | .0047 | .0000 | 0.001 | -.0006 | -.0000 | -.0002 |
| | 00.5 | 0.011 | .0171 | -.0012 | -.0000 | 0.002 | -.0007 | .0012 | -.0049 |
| | 01.9 | 0.071 | .0182 | -.0160 | -.0001 | 0.002 | -.0007 | .0060 | -.0226 |
| | 03.9 | 0.159 | .0264 | -.0361 | -.0000 | 0.002 | -.0009 | .0130 | -.0510 |
| | 05.9 | 0.246 | .0401 | -.0534 | .0000 | 0.002 | -.0009 | .0205 | -.0814 |
| | 07.9 | 0.335 | .0603 | -.0715 | .0000 | 0.002 | -.0011 | .0276 | -.1079 |
| | 09.9 | 0.420 | .0866 | -.0889 | .0000 | 0.001 | -.0011 | .0345 | -.1324 |
| | 11.9 | 0.505 | .1189 | -.1052 | .0002 | 0.001 | -.0015 | .0412 | -.1567 |
| | 13.9 | 0.586 | .1567 | -.1213 | .0003 | 0.001 | -.0020 | .0471 | -.1787 |
| | 16.0 | 0.671 | .2080 | -.1377 | .0003 | 0.002 | -.0010 | .0532 | -.1987 |
| | 18.0 | 0.747 | .2516 | -.1502 | .0008 | 0.002 | -.0019 | .0586 | -.2187 |
| 1.70 | -06.2 | -0.241 | .0405 | .0532 | .0002 | -0.000 | -.0000 | -.0187 | .0738 |
| | -04.1 | -0.164 | .0271 | .0392 | .0002 | 0.000 | -.0000 | -.0119 | .0480 |
| | -02.1 | -0.083 | .0188 | .0287 | .0003 | 0.000 | -.0002 | -.0051 | .0216 |
| | -00.6 | -0.028 | .0165 | .0100 | .0002 | 0.000 | -.0002 | -.0009 | .0043 |
| | -00.1 | -0.008 | .0163 | .0058 | .0000 | 0.001 | -.0003 | .0005 | -.0017 |
| | 00.4 | 0.009 | .0161 | .0016 | .0000 | 0.001 | -.0003 | .0017 | -.0071 |
| | 01.9 | 0.065 | .0179 | -.0105 | -.0001 | 0.001 | -.0005 | .0063 | -.0253 |
| | 03.9 | 0.145 | .0248 | -.0261 | -.0000 | 0.002 | -.0007 | .0130 | -.0513 |
| | 05.9 | 0.233 | .0368 | -.0410 | -.0001 | 0.001 | -.0007 | .0197 | -.0760 |
| | 07.9 | 0.298 | .0548 | -.0543 | -.0001 | 0.001 | -.0007 | .0257 | -.0975 |
| | 09.9 | 0.373 | .0779 | -.0684 | -.0001 | 0.001 | -.0008 | .0314 | -.1189 |
| | 11.9 | 0.450 | .1071 | -.0816 | -.0000 | 0.001 | -.0012 | .0376 | -.1427 |
| | 13.9 | 0.526 | .1419 | -.0952 | -.0002 | 0.001 | -.0012 | .0430 | -.1629 |
| | 15.9 | 0.594 | .1806 | -.1048 | .0000 | 0.002 | -.0007 | .0484 | -.1833 |
| | 17.9 | 0.661 | .2236 | -.1115 | .0003 | 0.002 | -.0013 | .0533 | -.2019 |
| 1.90 | -06.0 | -0.214 | .0366 | .0443 | .0001 | -0.000 | -.0000 | -.0162 | .0631 |
| | -04.0 | -0.143 | .0245 | .0315 | .0002 | -0.000 | -.0000 | -.0105 | .0411 |
| | -02.0 | -0.071 | .0177 | .0181 | .0001 | 0.000 | -.0002 | -.0045 | .0189 |
| | -00.5 | -0.018 | .0154 | .0076 | -.0001 | 0.000 | -.0002 | -.0003 | .0016 |
| | 00.1 | -0.001 | .0151 | .0045 | -.0001 | -0.000 | -.0002 | .0008 | -.0034 |
| | 00.5 | 0.012 | .0153 | .0015 | -.0001 | 0.000 | -.0002 | .0020 | -.0083 |
| | 02.0 | 0.068 | .0173 | -.0097 | -.0001 | 0.001 | -.0004 | .0063 | -.0249 |
| | 04.1 | 0.141 | .0242 | -.0226 | -.0001 | 0.001 | -.0004 | .0126 | -.0494 |
| | 06.1 | 0.210 | .0359 | -.0345 | -.0001 | 0.001 | -.0005 | .0183 | -.0709 |
| | 08.0 | 0.281 | .0530 | -.0467 | -.0000 | 0.001 | -.0007 | .0238 | -.0906 |
| | 10.0 | 0.347 | .0741 | -.0568 | -.0000 | 0.001 | -.0008 | .0288 | -.1087 |
| | 12.1 | 0.417 | .1016 | -.0677 | .0001 | 0.000 | -.0012 | .0340 | -.1278 |
| | 14.1 | 0.483 | .1331 | -.0763 | .0001 | 0.000 | -.0016 | .0390 | -.1462 |
| | 16.0 | 0.542 | .1668 | -.0812 | -.0000 | 0.002 | -.0009 | .0431 | -.1618 |
| | 18.0 | 0.604 | .2077 | -.0824 | .0002 | 0.002 | -.0014 | .0474 | -.1774 |
| 2.22 | -05.7 | -0.182 | .0326 | .0304 | .0001 | 0.000 | -.0001 | -.0146 | .0557 |
| | -03.7 | -0.118 | .0223 | .0214 | .0001 | 0.001 | -.0004 | -.0091 | .0358 |
| | -01.7 | -0.054 | .0165 | .0119 | .0001 | 0.000 | -.0003 | -.0033 | .0138 |
| | -00.1 | -0.007 | .0149 | .0038 | -.0001 | 0.001 | -.0006 | .0003 | -.0007 |
| | 00.3 | 0.006 | .0146 | .0014 | -.0001 | 0.001 | -.0005 | .0013 | -.0051 |
| | 00.8 | 0.022 | .0153 | -.0013 | -.0001 | 0.001 | -.0005 | .0027 | -.0108 |
| | 02.3 | 0.070 | .0173 | -.0100 | -.0001 | 0.001 | -.0006 | .0065 | -.0252 |
| | 04.3 | 0.135 | .0242 | -.0196 | -.0002 | 0.001 | -.0007 | .0118 | -.0454 |
| | 06.3 | 0.195 | .0353 | -.0279 | -.0001 | 0.001 | -.0008 | .0169 | -.0635 |
| | 08.3 | 0.257 | .0511 | -.0364 | -.0001 | 0.001 | -.0008 | .0218 | -.0796 |
| | 10.3 | 0.317 | .0708 | -.0431 | -.0001 | 0.001 | -.0010 | .0265 | -.0956 |
| | 12.3 | 0.378 | .0952 | -.0488 | -.0001 | 0.001 | -.0012 | .0314 | -.1140 |
| | 14.3 | 0.436 | .1241 | -.0514 | -.0002 | 0.001 | -.0013 | .0359 | -.1315 |
| | 16.3 | 0.498 | .1576 | -.0525 | -.0003 | 0.001 | -.0007 | .0400 | -.1478 |
| | 18.3 | 0.555 | .1957 | -.0512 | -.0004 | 0.001 | -.0007 | .0441 | -.1649 |

TABLE II.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 0^{\circ}$ - Continued
(c) BVWC; $\delta = 2.5^{\circ}$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ | $C_{Z_c}$ | $C_{h_c}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.70 | -0 6.4 | -0.328 | .0445 | .0697 | .0005 | -0.004 | .0019 | .0035 | .0431 |
| | -0 2.2 | -0.100 | .0151 | .0322 | .0007 | -0.002 | .0015 | .0089 | -.0008 |
| | -0 0.3 | -0.019 | .0126 | .0226 | -.0000 | -0.001 | .0009 | .0111 | -.0208 |
| | 0 01.7 | 0.064 | .0132 | .0151 | .0001 | -0.001 | .0005 | .0135 | -.0404 |
| | 0 05.7 | 0.275 | .0374 | -.0084 | .0000 | -0.000 | .0002 | .0190 | -.0834 |
| | 0 09.8 | 0.507 | .0949 | -.0348 | .0001 | 0.003 | -.0014 | .0250 | -.1293 |
| | 0 13.7 | 0.756 | .1891 | -.0605 | -.0002 | 0.003 | -.0011 | .0309 | -.1765 |
| | 0 17.8 | 1.002 | .3208 | -.0870 | .0003 | 0.009 | -.0049 | .0357 | -.2051 |
| 0.90 | -0 6.3 | -0.349 | .0466 | .0879 | .0007 | -0.004 | .0018 | .0075 | .0567 |
| | -0 2.0 | -0.103 | .0149 | .0378 | .0006 | -0.002 | .0012 | .0163 | -.0007 |
| | -0 0.1 | -0.012 | .0126 | .0235 | -.0001 | -0.001 | .0007 | .0197 | -.0249 |
| | 0 02.0 | 0.083 | .0148 | .0114 | .0001 | -0.001 | .0003 | .0239 | -.0533 |
| | 0 05.9 | 0.305 | .0423 | -.0248 | -.0000 | 0.000 | -.0001 | .0131 | -.0497 |
| | 0 09.9 | 0.572 | .1096 | -.0770 | -.0001 | 0.002 | -.0014 | .0376 | -.1747 |
| | 0 13.9 | 0.841 | .2180 | -.1412 | -.0005 | 0.002 | -.0008 | .0445 | -.2415 |
| | 0 17.9 | 1.096 | .3621 | -.2068 | .0008 | 0.008 | -.0044 | .0502 | -.2885 |
| 1.00 | -0 5.8 | -0.354 | .0518 | .1159 | .0004 | -0.004 | .0017 | .0082 | .0572 |
| | -0 1.9 | -0.110 | .0214 | .0478 | .0005 | -0.002 | .0015 | .0149 | -.0019 |
| | 0 00.3 | 0.004 | .0179 | .0165 | -.0002 | -0.002 | .0009 | .0179 | -.0307 |
| | 0 02.3 | 0.109 | .0223 | -.0088 | -.0001 | -0.001 | .0007 | .0211 | -.0602 |
| | 0 06.3 | 0.348 | .0547 | -.0667 | -.0000 | -0.001 | .0003 | .0274 | -.1132 |
| | 0 10.3 | 0.594 | .1231 | -.1203 | -.0000 | -0.001 | -.0004 | .0350 | -.1836 |
| | 0 14.2 | 0.823 | .2233 | -.1662 | -.0000 | 0.000 | -.0006 | .0419 | -.2517 |
| | 0 18.2 | 1.047 | .3570 | -.2109 | .0005 | 0.003 | -.0021 | .0490 | -.3137 |
| 1.10 | -0 6.0 | -0.357 | .0534 | .1233 | .0007 | -0.001 | .0009 | .0071 | .0621 |
| | -0 1.9 | -0.115 | .0230 | .0567 | .0007 | -0.002 | .0007 | .0138 | .0014 |
| | 0 00.1 | -0.009 | .0197 | .0220 | .0001 | -0.000 | .0004 | .0163 | -.0221 |
| | 0 02.1 | 0.090 | .0225 | -.0017 | -.0000 | 0.001 | .0001 | .0193 | -.0501 |
| | 0 06.0 | 0.311 | .0493 | -.0563 | .0000 | 0.000 | .0000 | | |
| | 0 10.1 | 0.572 | .1166 | -.1239 | .0001 | 0.000 | -.0008 | .0322 | -.1679 |
| | 0 14.1 | 0.767 | .2063 | -.1461 | .0002 | 0.002 | -.0015 | .0388 | -.2277 |
| | 0 18.1 | 0.965 | .3308 | -.1970 | .0009 | 0.007 | -.0036 | .0456 | -.2911 |
| 1.30 | -0 6.1 | -0.303 | .0444 | .0957 | .0004 | -0.001 | .0006 | -.0028 | .0632 |
| | -0 1.9 | -0.091 | .0186 | .0389 | .0005 | -0.000 | .0001 | .0039 | .0035 |
| | 0 00.1 | -0.004 | .0165 | .0162 | .0001 | 0.000 | -.0002 | .0067 | -.0231 |
| | 0 02.1 | 0.085 | .0191 | -.0033 | .0000 | 0.000 | -.0002 | .0101 | -.0537 |
| | 0 06.0 | 0.281 | .0443 | -.0487 | -.0000 | -0.000 | -.0000 | .0165 | -.1122 |
| | 0 10.1 | 0.491 | .1001 | -.0984 | -.0000 | 0.001 | -.0008 | .0226 | -.1652 |
| | 0 14.0 | 0.699 | .1848 | -.1485 | .0002 | 0.001 | -.0009 | .0282 | -.2175 |
| | 0 18.0 | 0.882 | .2960 | -.1813 | .0022 | 0.003 | -.0051 | .0340 | -.2663 |
| 1.70 | -0 6.3 | -0.245 | .0407 | .0682 | .0002 | -0.000 | -.0000 | -.0024 | .0541 |
| | -0 2.2 | -0.083 | .0185 | .0352 | .0003 | -0.000 | -.0001 | .0037 | .0010 |
| | -0 0.1 | -0.009 | .0163 | .0184 | .0001 | 0.000 | -.0003 | .0062 | -.0226 |
| | 0 00.9 | 0.066 | .0185 | .0041 | -.0000 | 0.000 | -.0004 | .0089 | -.0480 |
| | 0 05.9 | 0.225 | .0387 | -.0265 | -.0001 | 0.002 | -.0007 | .0142 | -.0955 |
| | 0 09.9 | 0.380 | .0814 | -.0564 | .0001 | 0.001 | -.0013 | .0190 | -.1375 |
| | 0 13.8 | 0.533 | .1453 | -.0842 | -.0002 | 0.001 | -.0001 | .0238 | -.1805 |
| | 0 17.8 | 0.671 | .2284 | -.1033 | .0008 | 0.003 | -.0021 | .0281 | -.2179 |
| 2.22 | -0 5.8 | -0.188 | .0325 | .0443 | .0000 | -0.000 | .0000 | -.0025 | .0413 |
| | -0 1.8 | -0.054 | .0163 | .0237 | .0001 | 0.001 | -.0003 | .0026 | -.0023 |
| | 0 00.4 | 0.007 | .0151 | .0135 | -.0001 | 0.001 | -.0004 | .0049 | -.0232 |
| | 0 02.4 | 0.071 | .0175 | .0036 | -.0002 | 0.001 | -.0004 | .0071 | -.0444 |
| | 0 06.3 | 0.198 | .0365 | -.0163 | -.0001 | 0.000 | -.0006 | .0112 | -.0804 |
| | 0 10.3 | 0.322 | .0731 | -.0347 | -.0001 | -0.000 | -.0010 | .0151 | -.1131 |
| | 0 14.3 | 0.444 | .1274 | -.0450 | -.0004 | 0.000 | -.0006 | .0195 | -.1473 |
| | 0 18.3 | 0.565 | .2004 | -.0467 | .0002 | -0.000 | -.0019 | .0242 | -.1803 |

TABLE II.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 0^\circ$ - Continued
(d) BVWC; $\delta = 5.2^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ | $C_{Z_c}$ | $C_{h_c}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.70 | -06.3 | -0.305 | .0407 | .0806 | .0005 | -0.002 | .0017 | -.0094 | .0271 |
| | -02.3 | -0.097 | .0150 | .0422 | .0008 | -0.001 | .0011 | .0041 | -.0127 |
| | -00.3 | -0.014 | .0131 | .0333 | .0001 | -0.000 | .0005 | .0120 | -.0346 |
| | 01.7 | 0.069 | .0146 | .0265 | .0002 | 0.000 | .0002 | .0210 | -.0564 |
| | 05.8 | 0.279 | .0399 | .0053 | .0002 | 0.000 | -.0001 | .0399 | -.1003 |
| | 09.7 | 0.506 | .0968 | -.0197 | -.0000 | 0.001 | -.0009 | .0596 | -.1451 |
| | 13.6 | 0.750 | .1899 | -.0440 | .0001 | 0.006 | -.0022 | | |
| | 17.7 | 1.003 | .3250 | -.0896 | .0001 | 0.009 | -.0033 | .0943 | -.2061 |
| 0.90 | -06.1 | -0.324 | .0425 | .0995 | .0007 | -0.002 | .0015 | -.0095 | .0325 |
| | -02.1 | -0.102 | .0150 | .0486 | .0006 | -0.001 | .0009 | .0047 | -.0163 |
| | 00.0 | -0.006 | .0130 | .0356 | -.0000 | -0.000 | .0004 | .0137 | -.0450 |
| | 00.9 | 0.083 | .0155 | .0231 | .0002 | 0.000 | .0001 | .0228 | -.0746 |
| | 05.9 | 0.313 | .0450 | -.0111 | .0001 | 0.001 | -.0004 | .0424 | -.1346 |
| | 09.9 | 0.574 | .1120 | -.0630 | -.0001 | 0.001 | -.0010 | .0617 | -.1956 |
| | 13.9 | 0.838 | .2191 | -.1247 | -.0003 | 0.005 | -.0016 | .0797 | -.2525 |
| | 17.9 | 1.081 | .3585 | -.2041 | .0011 | 0.016 | -.0037 | .0879 | -.2578 |
| 1.00 | -05.7 | -0.340 | .0491 | .1296 | .0004 | -0.004 | .0020 | -.0085 | .0285 |
| | -01.7 | -0.100 | .0227 | .0571 | .0005 | -0.003 | .0017 | .0045 | -.0184 |
| | 00.3 | 0.003 | .0198 | .0306 | -.0002 | -0.002 | .0009 | .0137 | -.0504 |
| | 02.3 | 0.109 | .0246 | .0047 | -.0001 | -0.002 | .0007 | .0222 | -.0776 |
| | 06.3 | 0.348 | .0578 | -.0499 | -.0000 | -0.001 | .0001 | .0413 | -.1442 |
| | 10.2 | 0.589 | .1251 | -.1035 | .0000 | 0.002 | -.0008 | .0599 | -.2127 |
| | 14.3 | 0.819 | .2256 | -.1488 | -.0002 | 0.004 | -.0010 | .0777 | -.2773 |
| | 18.3 | 1.029 | .3567 | -.1949 | .0004 | 0.006 | -.0027 | .0936 | -.3370 |
| 1.10 | -05.9 | -0.354 | .0521 | .1408 | .0005 | -0.004 | .0016 | -.0082 | .0286 |
| | -01.9 | -0.114 | .0228 | .0670 | .0004 | -0.003 | .0011 | .0052 | -.0219 |
| | 00.2 | -0.012 | .0197 | .0376 | -.0000 | -0.002 | .0009 | .0130 | -.0468 |
| | 02.1 | 0.087 | .0238 | .0146 | -.0002 | -0.001 | .0003 | .0222 | -.0794 |
| | 06.1 | 0.311 | .0541 | -.0371 | -.0001 | -0.001 | -.0003 | .0395 | -.1390 |
| | 10.1 | 0.565 | .1181 | -.1092 | -.0001 | -0.001 | -.0002 | .0561 | -.1952 |
| | 14.2 | 0.762 | .2103 | -.1321 | -.0000 | 0.001 | -.0010 | .0719 | -.2542 |
| | 18.1 | 0.943 | .3285 | -.1801 | .0005 | 0.004 | -.0025 | .0859 | -.3108 |
| 1.30 | -06.0 | -0.289 | .0428 | .1061 | .0005 | -0.001 | .0005 | -.0086 | .0363 |
| | -02.0 | -0.095 | .0193 | .0517 | .0005 | 0.000 | -.0001 | .0040 | -.0151 |
| | 00.1 | -0.007 | .0171 | .0309 | .0001 | 0.001 | -.0003 | .0118 | -.0451 |
| | 02.0 | 0.076 | .0197 | .0124 | .0001 | 0.001 | -.0003 | .0195 | -.0733 |
| | 06.0 | 0.281 | .0460 | -.0345 | .0000 | 0.001 | -.0004 | .0353 | -.1329 |
| | 10.0 | 0.491 | .1015 | -.0868 | -.0001 | 0.001 | -.0007 | .0505 | -.1863 |
| | 14.0 | 0.693 | .1860 | -.1352 | -.0001 | 0.002 | -.0010 | .0642 | -.2352 |
| | 18.0 | 0.872 | .2961 | -.1707 | .0010 | 0.003 | -.0030 | .0761 | -.2797 |
| 1.70 | -06.2 | -0.235 | .0390 | .0816 | .0002 | -0.001 | .0002 | -.0066 | .0285 |
| | -02.2 | -0.084 | .0193 | .0472 | .0003 | -0.000 | -.0001 | .0047 | -.0175 |
| | -00.1 | -0.012 | .0172 | .0317 | .0001 | 0.000 | -.0003 | .0111 | -.0417 |
| | 01.9 | 0.060 | .0193 | .0177 | -.0000 | 0.000 | -.0004 | .0177 | -.0657 |
| | 05.9 | 0.282 | .0402 | -.0136 | -.0001 | 0.001 | -.0007 | .0302 | -.1120 |
| | 09.9 | 0.376 | .0821 | -.0457 | -.0001 | 0.002 | -.0008 | .0415 | -.1533 |
| | 13.8 | 0.525 | .1461 | -.0733 | -.0001 | 0.002 | -.0011 | .0517 | -.1934 |
| | 17.9 | 0.662 | .2304 | -.0936 | .0005 | 0.002 | -.0026 | .0615 | -.2300 |
| 2.22 | -05.8 | -0.175 | .0309 | .0534 | .0000 | -0.001 | .0002 | -.0049 | .0219 |
| | -01.7 | -0.052 | .0166 | .0335 | .0001 | -0.000 | -.0001 | .0054 | -.0179 |
| | 00.4 | 0.009 | .0158 | .0240 | -.0001 | -0.000 | -.0002 | .0109 | -.0387 |
| | 02.4 | 0.072 | .0186 | .0133 | -.0001 | 0.001 | -.0005 | .0162 | -.0589 |
| | 06.4 | 0.199 | .0385 | -.0066 | -.0001 | 0.001 | -.0007 | .0257 | -.0921 |
| | 10.3 | 0.318 | .0742 | -.0252 | -.0001 | 0.001 | -.0008 | .0345 | -.1216 |
| | 14.4 | 0.436 | .1285 | -.0358 | -.0002 | 0.001 | -.0010 | .0434 | -.1568 |
| | 18.3 | 0.549 | .1981 | -.0356 | -.0006 | 0.001 | -.0004 | .0517 | -.1921 |

TABLE II.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 0^\circ$ - Continued

(e) BVWC; $\delta = 9.7^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ | $C_{Z_c}$ | $C_{h_c}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.70 | -0.63 | -0.290 | .0390 | .1049 | .0008 | -0.001 | .0016 | .0033 | -.0133 |
| | -0.23 | -0.089 | .0165 | .0702 | .0010 | -0.001 | .0013 | .0184 | -.0517 |
| | -0.02 | -0.002 | .0158 | .0615 | .0001 | -0.001 | .0009 | .0275 | -.0744 |
| | 0.017 | 0.074 | .0183 | .0531 | .0002 | -0.001 | .0006 | .0366 | -.0961 |
| | 0.057 | 0.279 | .0464 | .0371 | .0002 | -0.002 | .0006 | .0561 | -.1398 |
| | 0.095 | 0.514 | .1043 | .0125 | -.0001 | -0.001 | .0001 | .0749 | -.1782 |
| | 0.137 | 0.761 | .2031 | -.0146 | -.0003 | 0.001 | -.0001 | .0947 | -.2199 |
| | 0.177 | 0.993 | .3296 | -.0804 | .0002 | 0.010 | -.0019 | .0924 | -.1995 |
| 0.90 | -0.21 | -0.098 | .0175 | .0786 | .0007 | -0.002 | .0012 | .0192 | -.0630 |
| | -0.00 | -0.008 | .0171 | .0666 | .0001 | -0.001 | .0008 | .0285 | -.0923 |
| | 0.019 | 0.079 | .0200 | .0513 | .0003 | -0.001 | .0007 | .0377 | -.1210 |
| | 0.059 | 0.296 | .0509 | .0228 | .0000 | -0.003 | .0006 | .0567 | -.1799 |
| | 0.100 | 0.553 | .1195 | -.0269 | -.0002 | -0.001 | -.0002 | .0746 | -.2391 |
| | 0.140 | 0.801 | .2215 | -.1046 | -.0003 | 0.001 | -.0007 | .0832 | -.2235 |
| | 0.180 | 1.036 | .3553 | -.2004 | .0000 | 0.004 | -.0016 | .0802 | -.2192 |
| 1.00 | -0.58 | -0.353 | .0517 | .1618 | .0004 | -0.001 | .0015 | .0030 | -.0197 |
| | -0.17 | -0.103 | .0250 | .0880 | .0006 | -0.002 | .0017 | .0190 | -.0715 |
| | 0.003 | 0.002 | .0243 | .0608 | -.0000 | -0.001 | .0008 | .0285 | -.1046 |
| | 0.023 | 0.100 | .0298 | .0323 | -.0000 | -0.002 | .0010 | .0380 | -.1390 |
| | 0.063 | 0.331 | .0624 | -.0166 | -.0001 | -0.002 | .0008 | .0550 | -.1984 |
| | 0.103 | 0.563 | .1306 | -.0651 | -.0001 | -0.002 | .0003 | .0722 | -.2621 |
| | 0.143 | 0.790 | .2298 | -.1146 | -.0003 | -0.002 | .0002 | .0880 | -.3175 |
| | 0.182 | 0.984 | .3540 | -.1584 | .0003 | 0.001 | -.0012 | .1008 | -.3644 |
| 1.10 | -0.59 | -0.355 | .0526 | .1688 | .0006 | -0.001 | .0011 | .0027 | -.0168 |
| | -0.19 | -0.111 | .0235 | .0948 | .0007 | -0.001 | .0009 | .0183 | -.0675 |
| | 0.002 | -0.008 | .0244 | .0664 | .0004 | -0.002 | .0012 | .0267 | -.0960 |
| | 0.021 | 0.083 | .0282 | .0403 | .0001 | -0.000 | .0001 | .0364 | -.1368 |
| | 0.061 | 0.294 | .0600 | -.0057 | -.0001 | -0.002 | .0004 | .0519 | -.1846 |
| | 0.101 | 0.549 | .1251 | -.0774 | -.0001 | -0.001 | -.0001 | .0672 | -.2391 |
| | 0.142 | 0.753 | .2178 | -.1128 | .0001 | -0.001 | -.0002 | .0805 | -.2893 |
| | 0.182 | 0.915 | .3222 | -.1490 | .0003 | 0.001 | -.0012 | .0934 | -.3378 |
| 1.30 | -0.60 | -0.292 | .0441 | .1351 | .0005 | -0.000 | .0005 | .0029 | -.0131 |
| | -0.20 | -0.094 | .0215 | .0810 | .0007 | -0.000 | .0004 | .0173 | -.0669 |
| | 0.001 | -0.008 | .0198 | .0593 | .0002 | -0.000 | .0001 | .0252 | -.0962 |
| | 0.020 | 0.071 | .0235 | .0349 | .0000 | -0.001 | .0003 | .0325 | -.1232 |
| | 0.060 | 0.273 | .0512 | -.0115 | -.0001 | -0.002 | .0004 | .0470 | -.1784 |
| | 0.100 | 0.476 | .1057 | -.0598 | -.0004 | -0.001 | .0004 | .0605 | -.2255 |
| | 0.140 | 0.669 | .1901 | -.1096 | -.0001 | -0.001 | -.0006 | .0726 | -.2665 |
| | 0.181 | 0.843 | .2989 | -.1445 | .0006 | 0.000 | -.0016 | .0835 | -.3097 |
| 1.70 | -0.62 | -0.223 | .0381 | .1042 | .0002 | -0.000 | .0001 | .0042 | -.0142 |
| | -0.21 | -0.076 | .0208 | .0710 | .0005 | -0.000 | .0000 | .0160 | -.0579 |
| | -0.01 | -0.008 | .0199 | .0543 | .0002 | -0.000 | .0001 | .0221 | -.0811 |
| | 0.019 | 0.059 | .0223 | .0366 | .0001 | -0.001 | -.0000 | .0281 | -.1030 |
| | 0.059 | 0.226 | .0450 | .0040 | -.0001 | -0.000 | -.0001 | .0396 | -.1457 |
| | 0.098 | 0.379 | .0878 | -.0270 | -.0002 | -0.000 | -.0004 | .0500 | -.1843 |
| | 0.138 | 0.529 | .1535 | -.0596 | -.0002 | -0.000 | -.0005 | .0601 | -.2249 |
| | 0.178 | 0.662 | .2368 | -.0793 | .0002 | -0.000 | -.0009 | .0694 | -.2632 |
| 2.22 | -0.58 | -0.166 | .0302 | .0758 | .0000 | -0.000 | .0001 | .0049 | -.0137 |
| | -0.16 | -0.043 | .0182 | .0547 | .0001 | -0.001 | .0000 | .0153 | -.0510 |
| | 0.003 | 0.011 | .0182 | .0443 | -.0001 | -0.001 | .0001 | .0201 | -.0702 |
| | 0.023 | 0.068 | .0211 | .0319 | -.0001 | -0.001 | -.0001 | .0249 | -.0894 |
| | 0.063 | 0.201 | .0422 | .0102 | -.0001 | -0.000 | -.0001 | .0337 | -.1192 |
| | 0.104 | 0.324 | .0804 | -.0108 | -.0002 | -0.001 | -.0002 | .0424 | -.1495 |
| | 0.144 | 0.438 | .1345 | -.0231 | -.0002 | -0.002 | -.0006 | .0512 | -.1867 |
| | 0.182 | 0.546 | .2031 | -.0223 | -.0005 | -0.001 | .0000 | .0587 | -.2188 |

TABLE II.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 0^\circ$ - Concluded
(f) BVWC; $\delta = 19.5^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ | $C_{Z_c}$ | $C_{h_c}$ |
|---|---|---|---|---|---|---|---|---|---|
| 0.70 | -06.3 | -0.289 | .0491 | .1575 | .0010 | -0.001 | .0015 | .0283 | -.0867 |
| | -02.3 | -0.078 | .0287 | .1233 | .0012 | -0.001 | .0013 | .0454 | -.1286 |
| | -00.2 | 0.008 | .0308 | .1150 | .0004 | 0.000 | .0005 | .0548 | -.1502 |
| | 01.7 | 0.082 | .0349 | .1048 | .0005 | -0.000 | .0003 | .0636 | -.1687 |
| | 05.7 | 0.278 | .0648 | .0814 | -.0001 | -0.000 | .0008 | .0796 | -.1991 |
| | 09.7 | 0.517 | .1268 | .0416 | -.0001 | 0.000 | -.0003 | .0914 | -.2183 |
| | 13.7 | 0.741 | .2130 | -.0305 | -.0014 | 0.008 | .0027 | .0873 | -.2086 |
| | 17.8 | 0.971 | .3357 | -.1077 | -.0002 | 0.008 | -.0012 | .0839 | -.2356 |
| 0.90 | -06.1 | -0.309 | .0521 | .1789 | .0010 | -0.001 | .0014 | .0296 | -.1046 |
| | -02.0 | -0.078 | .0295 | .1314 | .0009 | -0.000 | .0009 | .0474 | -.1623 |
| | -00.0 | 0.010 | .0311 | .1162 | .0003 | 0.001 | .0003 | .0560 | -.1875 |
| | 02.0 | 0.095 | .0350 | .0962 | .0004 | 0.000 | .0002 | .0646 | -.2153 |
| | 05.9 | 0.313 | .0701 | .0592 | .0000 | 0.000 | .0001 | .0801 | -.2561 |
| | 10.0 | 0.572 | .1366 | -.0194 | -.0003 | 0.001 | .0000 | .0831 | -.2458 |
| | 14.0 | 0.832 | .2413 | -.1189 | -.0006 | 0.004 | -.0003 | .0839 | -.2571 |
| | 18.0 | 1.076 | .3820 | -.2093 | -.0002 | 0.008 | -.0018 | .0887 | -.2779 |
| 1.00 | -05.7 | -0.326 | .0605 | .2099 | .0006 | -0.002 | .0018 | .0291 | -.1162 |
| | -01.6 | -0.080 | .0359 | .1383 | .0007 | -0.002 | .0016 | .0470 | -.1794 |
| | 00.3 | 0.012 | .0374 | .1125 | .0001 | -0.001 | .0009 | .0546 | -.2064 |
| | 02.3 | 0.112 | .0443 | .0768 | .0000 | -0.002 | .0004 | .0632 | -.2377 |
| | 06.3 | 0.351 | .0813 | .0212 | -.0001 | -0.002 | .0010 | .0789 | -.2963 |
| | 10.3 | 0.591 | .1527 | -.0373 | -.0003 | -0.002 | .0005 | .0912 | -.3350 |
| | 14.3 | 0.814 | .2513 | -.1105 | -.0003 | 0.001 | -.0006 | .0961 | -.3310 |
| | 18.3 | 1.024 | .3801 | -.1729 | .0006 | 0.005 | -.0021 | .1017 | -.3558 |
| 1.10 | -05.9 | -0.338 | .0612 | .2188 | .0008 | -0.002 | .0015 | .0279 | -.1109 |
| | -01.9 | -0.094 | .0371 | .1438 | .0008 | -0.001 | .0008 | .0445 | -.1727 |
| | 00.1 | 0.002 | .0378 | .1107 | .0001 | -0.000 | .0002 | .0520 | -.2001 |
| | 02.1 | 0.088 | .0428 | .0795 | -.0001 | -0.001 | .0005 | .0595 | -.2270 |
| | 06.1 | 0.311 | .0780 | .0258 | -.0002 | -0.001 | .0005 | .0728 | -.2752 |
| | 10.1 | 0.566 | .1443 | -.0499 | -.0002 | -0.000 | .0002 | .0842 | -.3079 |
| | 14.2 | 0.778 | .2392 | -.0970 | -.0007 | -0.001 | .0010 | .0927 | -.3306 |
| | 18.1 | 0.944 | .3518 | -.1639 | .0003 | 0.003 | -.0013 | .0947 | -.3326 |
| 1.30 | -06.0 | -0.274 | .0510 | .1797 | .0006 | -0.001 | .0007 | .0263 | -.1070 |
| | -01.9 | -0.075 | .0314 | .1194 | .0006 | -0.001 | .0005 | .0400 | -.1591 |
| | 00.0 | 0.005 | .0317 | .0948 | .0003 | -0.001 | .0003 | .0465 | -.1824 |
| | 02.0 | 0.083 | .0359 | .0659 | .0001 | -0.001 | .0001 | .0532 | -.2083 |
| | 06.0 | 0.293 | .0673 | .0153 | -.0002 | -0.002 | .0003 | .0659 | -.2574 |
| | 10.0 | 0.508 | .1274 | -.0425 | -.0003 | -0.001 | .0003 | .0769 | -.2936 |
| | 14.0 | 0.697 | .2126 | -.0973 | .0000 | 0.000 | -.0011 | .0869 | -.3335 |
| | 18.1 | 0.870 | .3219 | -.1521 | .0007 | 0.006 | -.0030 | .0907 | -.3341 |
| 1.70 | -06.1 | -0.222 | .0457 | .1470 | .0003 | -0.000 | .0001 | .0228 | -.0851 |
| | -02.0 | -0.069 | .0301 | .1080 | .0005 | -0.000 | -.0001 | .0339 | -.1276 |
| | -00.1 | -0.007 | .0303 | .0908 | .0003 | 0.000 | -.0003 | .0391 | -.1481 |
| | 01.9 | 0.058 | .0332 | .0706 | -.0002 | 0.000 | -.0002 | .0444 | -.1702 |
| | 05.9 | 0.227 | .0576 | .0338 | -.0002 | -0.000 | -.0004 | .0541 | -.2092 |
| | 09.9 | 0.385 | .1036 | -.0078 | .0000 | 0.000 | -.0012 | .0635 | -.2469 |
| | 13.9 | 0.528 | .1685 | -.0423 | -.0004 | 0.001 | -.0008 | .0724 | -.2824 |
| 2.22 | -05.7 | -0.156 | .0366 | .1078 | .0002 | 0.001 | -.0005 | .0205 | -.0658 |
| | -01.6 | -0.032 | .0265 | .0837 | .0001 | 0.000 | -.0006 | .0302 | -.1032 |
| | 00.4 | 0.020 | .0277 | .0724 | -.0001 | 0.001 | -.0007 | .0348 | -.1226 |
| | 02.3 | 0.076 | .0310 | .0564 | -.0001 | 0.001 | -.0005 | .0390 | -.1412 |
| | 06.3 | 0.210 | .0536 | .0310 | -.0001 | 0.001 | -.0009 | .0469 | -.1730 |
| | 10.3 | 0.328 | .0925 | .0070 | -.0001 | 0.001 | -.0011 | .0546 | -.2016 |
| | 14.3 | 0.443 | .1478 | -.0062 | -.0003 | 0.001 | -.0007 | .0636 | -.2432 |
| | 18.3 | 0.556 | .2214 | -.0061 | -.0003 | 0.000 | -.0009 | .0729 | -.2916 |

TABLE III.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 5^{\circ}$

(a) BVW

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -06.0 | -0.295 | .0423 | .0990 | -.0007 | -0.065 | .0265 |
| | -01.8 | -0.090 | .0178 | .0340 | -.0051 | -0.059 | .0239 |
| | 0001 | -0.015 | .0151 | .0108 | -.0073 | -0.056 | .0223 |
| | 0019 | 0.061 | .0160 | -.0119 | -.0084 | -0.056 | .0217 |
| | 0060 | 0.267 | .0381 | -.0802 | -.0117 | -0.055 | .0199 |
| | 0100 | 0.484 | .0913 | -.1492 | -.0147 | -0.056 | .0185 |
| | 0140 | 0.704 | .1765 | -.2167 | -.0160 | -0.058 | .0171 |
| | 0178 | 0.883 | .2801 | -.2699 | -.0119 | -0.056 | .0139 |
| 0.90 | -06.0 | -0.308 | .0447 | .1147 | -.0005 | -0.069 | .0293 |
| | -01.8 | -0.086 | .0179 | .0357 | -.0057 | -0.062 | .0259 |
| | 0001 | -0.008 | .0153 | .0098 | -.0080 | -0.058 | .0240 |
| | 0020 | 0.082 | .0168 | -.0204 | -.0094 | -0.058 | .0233 |
| | 0060 | 0.308 | .0433 | -.1049 | -.0132 | -0.058 | .0217 |
| | 0100 | 0.551 | .1050 | -.1984 | -.0165 | -0.058 | .0197 |
| | 0141 | 0.801 | .2069 | -.3040 | -.0171 | -0.061 | .0187 |
| | 0178 | 0.970 | .3173 | -.3648 | -.0075 | -0.068 | .0197 |
| 1.00 | -06.0 | -0.327 | .0558 | .1476 | -.0035 | -0.081 | .0365 |
| | -01.8 | -0.082 | .0231 | .0395 | -.0077 | -0.070 | .0314 |
| | 0001 | 0.011 | .0253 | .0007 | -.0109 | -0.069 | .0306 |
| | 0020 | 0.112 | .0253 | -.0423 | -.0119 | -0.066 | .0280 |
| | 0061 | 0.356 | .0552 | -.1497 | -.0155 | -0.067 | .0283 |
| | 0100 | 0.581 | .1179 | -.2452 | -.0184 | -0.068 | .0275 |
| | 0141 | 0.792 | .2116 | -.3317 | -.0194 | -0.069 | .0255 |
| | 0178 | 0.968 | .3210 | -.4055 | -.0202 | -0.062 | .0215 |
| 1.10 | -05.9 | -0.329 | .0554 | .1523 | -.0025 | -0.080 | .0364 |
| | -01.8 | -0.096 | .0266 | .0492 | -.0072 | -0.068 | .0311 |
| | 0001 | -0.012 | .0248 | .0115 | -.0104 | -0.063 | .0286 |
| | 0020 | 0.088 | .0252 | -.0303 | -.0122 | -0.061 | .0273 |
| | 0060 | 0.313 | .0509 | -.1284 | -.0147 | -0.060 | .0253 |
| | 0100 | 0.546 | .1112 | -.2300 | -.0187 | -0.068 | .0284 |
| | 0140 | 0.721 | .1949 | -.3005 | -.0175 | -0.064 | .0232 |
| | 0178 | 0.891 | .2971 | -.3728 | -.0184 | -0.054 | .0165 |
| 1.30 | -06.0 | -0.281 | .0465 | .1245 | -.0041 | -0.064 | .0265 |
| | -01.8 | -0.077 | .0217 | .0351 | -.0070 | -0.057 | .0241 |
| | 0001 | 0.001 | .0195 | .0024 | -.0090 | -0.053 | .0222 |
| | 0020 | 0.086 | .0213 | -.0326 | -.0104 | -0.053 | .0212 |
| | 0061 | 0.280 | .0449 | -.1173 | -.0125 | -0.050 | .0181 |
| | 0100 | 0.468 | .0946 | -.1966 | -.0128 | -0.048 | .0138 |
| | 0140 | 0.643 | .1692 | -.2670 | -.0125 | -0.044 | .0077 |
| | 0178 | 0.796 | .2603 | -.3242 | -.0112 | -0.039 | .0002 |
| 1.70 | -061 | -0.229 | .0423 | .0965 | -.0047 | -0.058 | .0199 |
| | -01.8 | -0.068 | .0212 | .0298 | -.0062 | -0.050 | .0171 |
| | 0001 | -0.005 | .0189 | .0043 | -.0075 | -0.046 | .0157 |
| | 0020 | 0.068 | .0210 | -.0251 | -.0085 | -0.046 | .0146 |
| | 0060 | 0.220 | .0393 | -.0875 | -.0096 | -0.044 | .0114 |
| | 0100 | 0.359 | .0773 | -.1407 | -.0091 | -0.042 | .0059 |
| | 0140 | 0.490 | .1335 | -.1832 | -.0087 | -0.039 | -.0019 |
| | 0178 | 0.615 | .2056 | -.2112 | -.0082 | -0.035 | -.0102 |
| 2.22 | -061 | -0.171 | .0350 | .0652 | -.0042 | -0.050 | .0131 |
| | -01.8 | -0.043 | .0187 | .0176 | -.0049 | -0.040 | .0100 |
| | 0001 | 0.011 | .0172 | -.0029 | -.0055 | -0.038 | .0086 |
| | 0020 | 0.069 | .0190 | -.0251 | -.0060 | -0.037 | .0074 |
| | 0060 | 0.189 | .0347 | -.0679 | -.0066 | -0.037 | .0036 |
| | 0100 | 0.300 | .0665 | -.1006 | -.0069 | -0.036 | -.0026 |
| | 0140 | 0.411 | .1158 | -.1227 | -.0069 | -0.038 | -.0093 |
| | 0178 | 0.513 | .1768 | -.1419 | -.0069 | -0.040 | -.0126 |

TABLE III.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 5^\circ$ - Continued
(b) BVWC; $\delta = 0^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -06.0 | -0.305 | .0440 | .0434 | .0025 | -0.060 | .0266 |
| | -01.9 | -0.094 | .0182 | .0201 | -.0042 | -0.058 | .0236 |
| | -00.0 | -0.017 | .0159 | .0111 | -.0073 | -0.057 | .0224 |
| | 00.20 | 0.064 | .0168 | .0042 | -.0098 | -0.055 | .0218 |
| | 00.59 | 0.267 | .0385 | -.0209 | -.0158 | -0.047 | .0194 |
| | 01.00 | 0.512 | .0959 | -.0506 | -.0195 | -0.037 | .0133 |
| | 01.40 | 0.754 | .1888 | -.0775 | -.0180 | -0.024 | .0018 |
| | 01.78 | 0.975 | .3078 | -.0956 | -.0153 | -0.012 | -.0041 |
| 0.90 | -05.9 | -0.313 | .0455 | .0584 | .0029 | -0.064 | .0296 |
| | -01.8 | -0.089 | .0184 | .0237 | -.0049 | -0.061 | .0255 |
| | 00.01 | -0.007 | .0161 | .0114 | -.0083 | -0.058 | .0240 |
| | 00.19 | 0.075 | .0177 | .0012 | -.0108 | -0.057 | .0233 |
| | 00.60 | 0.313 | .0441 | -.0399 | -.0183 | -0.049 | .0207 |
| | 01.00 | 0.576 | .1089 | -.0899 | -.0217 | -0.035 | .0126 |
| | 01.41 | 0.844 | .2167 | -.1539 | -.0183 | -0.023 | .0007 |
| | 01.78 | 1.077 | .3481 | -.2009 | -.0144 | -0.011 | -.0039 |
| 1.00 | -06.1 | -0.347 | .0597 | .0951 | -.0001 | -0.076 | .0365 |
| | -01.7 | -0.088 | .0272 | .0283 | -.0074 | -0.071 | .0317 |
| | 00.01 | 0.008 | .0225 | .0035 | -.0107 | -0.067 | .0292 |
| | 00.20 | 0.110 | .0282 | -.0215 | -.0138 | -0.067 | .0294 |
| | 00.61 | 0.362 | .0586 | -.0844 | -.0203 | -0.058 | .0273 |
| | 01.00 | 0.602 | .1227 | -.1379 | -.0212 | -0.044 | .0176 |
| | 01.41 | 0.837 | .2217 | -.1830 | -.0174 | -0.029 | .0072 |
| | 01.79 | 1.035 | .3419 | -.2201 | -.0142 | -0.019 | .0024 |
| 1.10 | -05.9 | -0.332 | .0563 | .0972 | .0002 | -0.071 | .0349 |
| | -01.7 | -0.091 | .0276 | .0322 | -.0068 | -0.066 | .0299 |
| | 00.01 | -0.003 | .0247 | .0086 | -.0103 | -0.064 | .0281 |
| | 00.20 | 0.091 | .0273 | -.0128 | -.0135 | -0.060 | .0268 |
| | 00.60 | 0.318 | .0531 | -.0665 | -.0193 | -0.052 | .0239 |
| | 01.00 | 0.574 | .1161 | -.1343 | -.0212 | -0.040 | .0167 |
| | 01.40 | 0.770 | .2047 | -.1597 | -.0165 | -0.030 | .0071 |
| | 01.77 | 0.945 | .3141 | -.2030 | -.0130 | -0.020 | .0020 |
| 1.30 | -06.1 | -0.290 | .0485 | .0733 | -.0015 | -0.059 | .0271 |
| | -01.8 | -0.080 | .0229 | .0225 | -.0062 | -0.056 | .0241 |
| | 00.01 | 0.001 | .0204 | .0035 | -.0091 | -0.054 | .0223 |
| | 00.21 | 0.088 | .0228 | -.0165 | -.0117 | -0.052 | .0212 |
| | 00.60 | 0.288 | .0463 | -.0627 | -.0157 | -0.043 | .0170 |
| | 01.00 | 0.494 | .0998 | -.1083 | -.0152 | -0.031 | .0086 |
| | 01.41 | 0.698 | .1842 | -.1574 | -.0125 | -0.029 | .0047 |
| | 01.78 | 0.869 | .2857 | -.1908 | -.0081 | -0.023 | -.0014 |
| 1.70 | -06.0 | -0.235 | .0437 | .0497 | -.0019 | -0.055 | .0206 |
| | -01.8 | -0.069 | .0221 | .0189 | -.0053 | -0.050 | .0172 |
| | 00.01 | -0.005 | .0200 | .0061 | -.0076 | -0.047 | .0155 |
| | 00.20 | 0.069 | .0220 | -.0086 | -.0097 | -0.044 | .0138 |
| | 00.60 | 0.229 | .0409 | -.0384 | -.0121 | -0.035 | .0081 |
| | 01.00 | 0.389 | .0837 | -.0669 | -.0105 | -0.031 | .0022 |
| | 01.41 | 0.536 | .1476 | -.0914 | -.0083 | -0.028 | -.0025 |
| | 01.79 | 0.665 | .2255 | -.1051 | -.0049 | -0.020 | -.0100 |
| 2.22 | -05.9 | -0.175 | .0360 | .0284 | -.0022 | -0.047 | .0134 |
| | -01.7 | -0.043 | .0192 | .0088 | -.0044 | -0.040 | .0101 |
| | 00.01 | 0.010 | .0180 | .0011 | -.0057 | -0.038 | .0085 |
| | 00.20 | 0.071 | .0201 | -.0086 | -.0070 | -0.036 | .0069 |
| | 00.61 | 0.200 | .0370 | -.0258 | -.0082 | -0.031 | .0021 |
| | 01.00 | 0.325 | .0724 | -.0407 | -.0077 | -0.030 | -.0019 |
| | 01.40 | 0.446 | .1251 | -.0491 | -.0072 | -0.028 | -.0064 |
| | 01.79 | 0.555 | .1924 | -.0517 | -.0054 | -0.026 | -.0106 |

TABLE III.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 5^\circ$ - Continued
(c) BVWC; $\delta = 9.7^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -0.61 | -0.311 | .0450 | .1121 | -.0015 | -0.064 | .0244 |
| | -01.7 | -0.081 | .0205 | .0749 | -.0074 | -0.063 | .0231 |
| | 0001 | -0.007 | .0204 | .0686 | -.0103 | -0.061 | .0224 |
| | 0020 | 0.073 | .0232 | .0602 | -.0130 | -0.058 | .0215 |
| | 0060 | 0.289 | .0511 | .0407 | -.0206 | -0.047 | .0219 |
| | 0099 | 0.516 | .1090 | .0194 | -.0254 | -0.029 | .0151 |
| | 0140 | 0.758 | .2040 | -.0239 | -.0250 | -0.009 | .0131 |
| | 0177 | 0.974 | .3192 | -.0712 | -.0221 | 0.008 | .0162 |
| 0.90 | -0.61 | -0.331 | .0489 | .1337 | -.0013 | -0.069 | .0274 |
| | -01.8 | -0.088 | .0216 | .0824 | -.0077 | -0.066 | .0254 |
| | 0001 | -0.003 | .0210 | .0712 | -.0111 | -0.064 | .0243 |
| | 0021 | 0.089 | .0243 | .0584 | -.0142 | -0.060 | .0228 |
| | 0061 | 0.326 | .0567 | .0250 | -.0223 | -0.050 | .0235 |
| | 0100 | 0.585 | .1238 | -.0234 | -.0278 | -0.029 | .0154 |
| | 0140 | 0.851 | .2295 | -.1087 | -.0267 | -0.008 | .0156 |
| | 0179 | 1.086 | .3644 | -.1914 | -.0208 | 0.007 | .0071 |
| 1.00 | -0.61 | -0.336 | .0585 | .1604 | -.0041 | -0.077 | .0343 |
| | -01.7 | -0.079 | .0286 | .0863 | -.0106 | -0.073 | .0309 |
| | 0001 | 0.014 | .0284 | .0636 | -.0139 | -0.071 | .0298 |
| | 0020 | 0.113 | .0326 | .0386 | -.0168 | -0.066 | .0276 |
| | 0060 | 0.366 | .0679 | -.0185 | -.0254 | -0.060 | .0302 |
| | 0100 | 0.613 | .1358 | -.0699 | -.0274 | -0.035 | .0193 |
| | 0141 | 0.843 | .2367 | -.1205 | -.0237 | -0.015 | .0104 |
| | 0178 | 1.026 | .3527 | -.1690 | -.0178 | -0.001 | .0042 |
| 1.10 | -0.60 | -0.342 | .0581 | .1661 | -.0031 | -0.076 | .0338 |
| | -01.7 | -0.090 | .0301 | .0928 | -.0109 | -0.069 | .0283 |
| | 0001 | -0.002 | .0293 | .0697 | -.0140 | -0.067 | .0276 |
| | 0019 | 0.083 | .0329 | .0498 | -.0170 | -0.063 | .0259 |
| | 0061 | 0.329 | .0650 | -.0077 | -.0243 | -0.052 | .0255 |
| | 0101 | 0.587 | .1322 | -.0779 | -.0254 | -0.032 | .0160 |
| | 0141 | 0.785 | .2223 | -.1082 | -.0218 | -0.015 | .0082 |
| | 0178 | 0.951 | .3343 | -.1573 | -.0157 | -0.003 | .0034 |
| 1.30 | -0.60 | -0.284 | .0481 | .1347 | -.0047 | -0.064 | .0258 |
| | -01.8 | -0.079 | .0257 | .0805 | -.0099 | -0.061 | .0242 |
| | 0001 | 0.002 | .0239 | .0611 | -.0125 | -0.059 | .0230 |
| | 0020 | 0.081 | .0276 | .0409 | -.0150 | -0.056 | .0217 |
| | 0061 | 0.300 | .0564 | -.0114 | -.0195 | -0.047 | .0202 |
| | 0099 | 0.512 | .1120 | -.0662 | -.0202 | -0.030 | .0141 |
| | 0140 | 0.712 | .1989 | -.1148 | -.0173 | -0.020 | .0120 |
| | 0179 | 0.878 | .3039 | -.1544 | -.0114 | -0.011 | .0091 |
| 1.70 | -0.60 | -0.229 | .0433 | .1048 | -.0048 | -0.057 | .0195 |
| | -01.7 | -0.067 | .0246 | .0713 | -.0090 | -0.051 | .0158 |
| | 0001 | 0.001 | .0238 | .0567 | -.0112 | -0.047 | .0137 |
| | 0020 | 0.063 | .0264 | .0438 | -.0134 | -0.043 | .0111 |
| | 0060 | 0.235 | .0491 | .0081 | -.0153 | -0.034 | .0074 |
| | 0100 | 0.391 | .0922 | -.0288 | -.0143 | -0.024 | .0046 |
| | 0139 | 0.535 | .1557 | -.0510 | -.0118 | -0.016 | .0026 |
| | 0179 | 0.666 | .2378 | -.0768 | -.0068 | -0.009 | -.0065 |
| 2.22 | -0.60 | -0.169 | .0361 | .0748 | -.0043 | -0.048 | .0133 |
| | -01.7 | -0.037 | .0218 | .0534 | -.0072 | -0.042 | .0095 |
| | 0001 | 0.014 | .0216 | .0447 | -.0084 | -0.039 | .0072 |
| | 0020 | 0.071 | .0244 | .0354 | -.0097 | -0.036 | .0052 |
| | 0061 | 0.210 | .0443 | .0116 | -.0108 | -0.029 | .0019 |
| | 0100 | 0.331 | .0812 | -.0060 | -.0102 | -0.025 | .0004 |
| | 0141 | 0.450 | .1361 | -.0207 | -.0083 | -0.023 | -.0048 |
| | 0178 | 0.554 | .2004 | -.0247 | -.0087 | -0.016 | -.0059 |

TABLE III.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 5^\circ$ - Continued
(d) BWC; $\delta = 0^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -05.9 | -0.315 | .0404 | .0524 | .0083 | -0.006 | -.0078 |
| | -01.7 | -0.093 | .0141 | .0226 | .0025 | -0.006 | -.0090 |
| | 0001 | -0.017 | .0116 | .0111 | .0000 | -0.005 | -.0093 |
| | 0020 | 0.061 | .0129 | .0016 | -.0033 | -0.004 | -.0096 |
| | 0060 | 0.264 | .0343 | -.0241 | -.0093 | -0.003 | -.0088 |
| | 0100 | 0.498 | .0908 | -.0509 | -.0135 | -0.006 | -.0079 |
| | 0140 | 0.736 | .1827 | -.0789 | -.0152 | -0.011 | -.0079 |
| | 0179 | 0.959 | .3035 | -.0981 | -.0154 | -0.007 | -.0069 |
| 0.90 | -06.0 | -0.331 | .0436 | .0673 | .0094 | -0.007 | -.0078 |
| | -01.8 | -0.098 | .0143 | .0257 | .0027 | -0.006 | -.0093 |
| | 0001 | -0.013 | .0117 | .0102 | -.0004 | -0.005 | -.0095 |
| | 0021 | 0.084 | .0135 | -.0046 | -.0044 | -0.005 | -.0098 |
| | 0061 | 0.310 | .0405 | -.0440 | -.0112 | -0.005 | -.0085 |
| | 0100 | 0.587 | .1096 | -.1042 | -.0156 | -0.009 | -.0070 |
| | 0140 | 0.840 | .2135 | -.1599 | -.0156 | -0.014 | -.0070 |
| | 0178 | 1.069 | .3460 | -.2069 | -.0157 | -0.011 | -.0044 |
| 1.00 | -05.9 | -0.339 | .0529 | .0943 | .0086 | -0.006 | -.0073 |
| | -01.8 | -0.087 | .0222 | .0279 | .0021 | -0.005 | -.0090 |
| | 0001 | 0.010 | .0192 | .0014 | -.0009 | -0.004 | -.0096 |
| | 0021 | 0.114 | .0221 | -.0249 | -.0046 | -0.004 | -.0096 |
| | 0061 | 0.357 | .0519 | -.0863 | -.0107 | -0.005 | -.0076 |
| | 0101 | 0.599 | .1181 | -.1410 | -.0140 | -0.009 | -.0058 |
| | 0142 | 0.831 | .2184 | -.1862 | -.0143 | -0.012 | -.0039 |
| | 0179 | 1.021 | .3342 | -.2208 | -.0139 | -0.011 | -.0012 |
| 1.10 | -05.9 | -0.347 | .0536 | .1022 | .0097 | -0.008 | -.0063 |
| | -01.8 | -0.107 | .0232 | .0386 | .0026 | -0.006 | -.0084 |
| | 0001 | -0.016 | .0194 | .0161 | -.0012 | -0.004 | -.0090 |
| | 0020 | 0.078 | .0213 | -.0088 | -.0043 | -0.004 | -.0095 |
| | 0062 | 0.311 | .0484 | -.0664 | -.0105 | -0.005 | -.0077 |
| | 0100 | 0.565 | .1109 | -.1348 | -.0140 | -0.009 | -.0057 |
| | 0141 | 0.764 | .2008 | -.1624 | -.0133 | -0.013 | -.0052 |
| | 0178 | 0.932 | .3083 | -.2038 | -.0125 | -0.010 | -.0030 |
| 1.30 | -05.9 | -0.295 | .0443 | .0761 | .0070 | -0.009 | -.0077 |
| | -01.6 | -0.083 | .0185 | .0251 | .0022 | -0.007 | -.0089 |
| | 0001 | -0.005 | .0162 | .0055 | -.0002 | -0.007 | -.0092 |
| | 0020 | 0.077 | .0184 | -.0151 | -.0034 | -0.007 | -.0092 |
| | 0060 | 0.276 | .0417 | -.0614 | -.0084 | -0.009 | -.0079 |
| | 0100 | 0.484 | .0961 | -.1068 | -.0101 | -0.012 | -.0067 |
| | 0141 | 0.688 | .1806 | -.1564 | -.0097 | -0.016 | -.0058 |
| | 0178 | 0.845 | .2766 | -.1882 | -.0077 | -0.017 | -.0051 |
| 1.70 | -05.9 | -0.237 | .0394 | .0518 | .0057 | -0.012 | -.0090 |
| | -01.8 | -0.080 | .0180 | .0225 | .0019 | -0.010 | -.0098 |
| | 0001 | -0.014 | .0163 | .0079 | -.0004 | -0.010 | -.0101 |
| | 0021 | 0.063 | .0181 | -.0076 | -.0033 | -0.010 | -.0101 |
| | 0060 | 0.220 | .0364 | -.0360 | -.0070 | -0.011 | -.0093 |
| | 0099 | 0.374 | .0778 | -.0635 | -.0072 | -0.015 | -.0094 |
| | 0140 | 0.521 | .1411 | -.0889 | -.0066 | -0.017 | -.0092 |
| | 0178 | 0.652 | .2188 | -.1043 | -.0045 | -0.022 | -.0088 |
| 2.22 | -05.9 | -0.181 | .0332 | .0288 | .0037 | -0.014 | -.0092 |
| | -01.8 | -0.052 | .0163 | .0102 | .0010 | -0.012 | -.0098 |
| | 0001 | 0.006 | .0150 | .0006 | -.0006 | -0.011 | -.0100 |
| | 0021 | 0.068 | .0170 | -.0086 | -.0024 | -0.012 | -.0100 |
| | 0060 | 0.189 | .0333 | -.0248 | -.0046 | -0.015 | -.0096 |
| | 0100 | 0.317 | .0685 | -.0401 | -.0052 | -0.019 | -.0101 |
| | 0140 | 0.436 | .1208 | -.0496 | -.0057 | -0.024 | -.0099 |
| | 0178 | 0.541 | .1847 | -.0521 | -.0062 | -0.030 | -.0074 |

TABLE III.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 5^\circ$ - Continued

(e) BWC; $\delta = 9.7^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -0.59 | -0.308 | .0391 | .1090 | .0056 | -0.010 | -.0091 |
| | -0.17 | -0.091 | .0171 | .0751 | -.0001 | -0.009 | -.0101 |
| | 0.01 | -0.013 | .0161 | .0662 | -.0029 | -0.008 | -.0102 |
| | 0.19 | 0.062 | .0190 | .0604 | -.0063 | -0.005 | -.0103 |
| | 0.60 | 0.275 | .0454 | .0424 | -.0134 | 0.005 | -.0106 |
| | 1.00 | 0.510 | .1063 | .0192 | -.0180 | 0.001 | -.0062 |
| | 1.41 | 0.747 | .2000 | -.0308 | -.0200 | 0.007 | -.0003 |
| | 1.78 | 0.957 | .3140 | -.0694 | -.0174 | 0.017 | .0090 |
| 0.90 | -0.60 | -0.332 | .0442 | .1312 | .0066 | -0.011 | -.0092 |
| | -0.31 | -0.092 | .0163 | .0808 | -.0000 | -0.010 | -.0102 |
| | 0.01 | -0.002 | .0164 | .0683 | -.0035 | -0.009 | -.0105 |
| | 0.20 | 0.080 | .0199 | .0580 | -.0072 | -0.007 | -.0106 |
| | 0.60 | 0.318 | .0512 | .0255 | -.0156 | 0.003 | -.0105 |
| | 0.99 | 0.574 | .1193 | -.0225 | -.0206 | -0.001 | -.0056 |
| | 1.41 | 0.840 | .2270 | -.1047 | -.0206 | 0.006 | .0027 |
| | 1.80 | 1.076 | .3642 | -.1919 | -.0171 | 0.005 | .0064 |
| 1.00 | -0.60 | -0.335 | .0521 | .1543 | .0057 | -0.013 | -.0084 |
| | -0.19 | -0.088 | .0241 | .0846 | -.0007 | -0.011 | -.0099 |
| | 0.01 | 0.007 | .0270 | .0619 | -.0040 | -0.008 | -.0104 |
| | 0.20 | 0.099 | .0279 | .0401 | -.0071 | -0.006 | -.0105 |
| | 0.60 | 0.350 | .0610 | -.0162 | -.0150 | 0.004 | -.0099 |
| | 1.00 | 0.600 | .1298 | -.0694 | -.0188 | -0.000 | -.0048 |
| | 1.40 | 0.330 | .2304 | -.1193 | -.0186 | -0.002 | -.0001 |
| | 1.79 | 1.020 | .3513 | -.1700 | -.0162 | 0.001 | .0047 |
| 1.10 | -0.59 | -3.387 | .0508 | .1603 | .0067 | -0.015 | -.0073 |
| | -0.18 | -1.046 | .0261 | .0941 | -.0003 | -0.012 | -.0092 |
| | 0.01 | -0.074 | .0244 | .0687 | -.0039 | -0.009 | -.0097 |
| | 0.20 | 0.831 | .0281 | .0471 | -.0076 | -0.006 | -.0104 |
| | 0.60 | 3.106 | .0583 | -.0036 | -.0150 | 0.001 | -.0099 |
| | 1.01 | 5.726 | .1261 | -.0748 | -.0174 | -0.002 | -.0051 |
| | 1.41 | 7.807 | .2190 | -.1102 | -.0171 | 0.001 | -.0021 |
| | 1.78 | 9.379 | .3265 | -.1554 | -.0142 | 0.001 | .0021 |
| 1.30 | -0.59 | -2.848 | .0416 | .1322 | .0047 | -0.012 | -.0092 |
| | -0.18 | -0.900 | .0211 | .0813 | -.0005 | -0.011 | -.0096 |
| | 0.01 | -0.058 | .0203 | .0613 | -.0032 | -0.010 | -.0098 |
| | 0.20 | 0.711 | .0235 | .0430 | -.0060 | -0.009 | -.0099 |
| | 0.60 | 2.872 | .0507 | -.0094 | -.0112 | -0.006 | -.0092 |
| | 1.00 | 4.968 | .1084 | -.0604 | -.0135 | -0.007 | -.0043 |
| | 1.41 | 7.046 | .1968 | -.1109 | -.0131 | -0.004 | -.0001 |
| | 1.77 | 8.650 | .2949 | -.1504 | -.0095 | -0.003 | .0032 |
| 1.70 | -0.60 | -2.374 | .0392 | .1055 | .0032 | -0.014 | -.0100 |
| | -0.17 | -0.722 | .0209 | .0708 | -.0017 | -0.013 | -.0105 |
| | 0.02 | -0.096 | .0202 | .0578 | -.0042 | -0.012 | -.0108 |
| | 0.20 | 0.551 | .0228 | .0448 | -.0074 | -0.012 | -.0109 |
| | 0.60 | 2.239 | .0448 | .0101 | -.0100 | -0.010 | -.0104 |
| | 0.99 | 3.796 | .0872 | -.0203 | -.0105 | -0.008 | -.0070 |
| | 1.41 | 5.293 | .1539 | -.0492 | -.0089 | -0.006 | -.0050 |
| | 1.77 | 6.547 | .2298 | -.0765 | -.0056 | -0.011 | -.0032 |
| 2.22 | -0.60 | -1.725 | .0329 | .0725 | .0020 | -0.016 | -.0095 |
| | -0.18 | -0.432 | .0190 | .0528 | -.0017 | -0.013 | -.0104 |
| | 0.01 | 0.082 | .0187 | .0443 | -.0034 | -0.013 | -.0107 |
| | 0.20 | 0.646 | .0215 | .0358 | -.0052 | -0.013 | -.0107 |
| | 0.60 | 2.012 | .0410 | .0126 | -.0069 | -0.013 | -.0100 |
| | 1.00 | 3.239 | .0771 | -.0053 | -.0072 | -0.012 | -.0087 |
| | 1.41 | 4.439 | .1322 | -.0215 | -.0062 | -0.018 | -.0085 |
| | 1.78 | 5.415 | .1950 | -.0242 | -.0077 | -0.016 | -.0056 |

TABLE III.- AERODYNAMIC CHARACTERISTICS OF WING-ON CONFIGURATIONS AT $\beta = 5^\circ$ - Concluded
(f) BW

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -06.0 | -0.307 | .0385 | .1075 | .0056 | -0.011 | -.0084 |
| | -01.8 | -0.089 | .0120 | .0348 | .0017 | -0.007 | -.0089 |
| | 0001 | -0.015 | .0108 | .0101 | -.0002 | -0.007 | -.0091 |
| | 0020 | 0.068 | .0118 | -.0162 | -.0026 | -0.007 | -.0093 |
| | 0061 | 0.274 | .0349 | -.0838 | -.0063 | -0.009 | -.0090 |
| | 0099 | 0.492 | .0888 | -.1539 | -.0094 | -0.016 | -.0080 |
| | 0140 | 0.726 | .1798 | -.2281 | -.0108 | -0.021 | -.0090 |
| | 0178 | 0.902 | .2842 | -.2790 | -.0058 | -0.019 | -.0131 |
| 0.90 | -06.0 | -0.318 | .0409 | .1235 | .0062 | -0.011 | -.0083 |
| | -01.8 | -0.086 | .0125 | .0359 | .0017 | -0.007 | -.0091 |
| | 0001 | -0.007 | .0106 | .0081 | -.0005 | -0.006 | -.0095 |
| | 0020 | 0.088 | .0123 | -.0253 | -.0034 | -0.007 | -.0094 |
| | 0061 | 0.317 | .0405 | -.1111 | -.0077 | -0.012 | -.0087 |
| | 0100 | 0.564 | .1042 | -.2079 | -.0110 | -0.019 | -.0078 |
| | 0140 | 0.814 | .2072 | -.3153 | -.0112 | -0.025 | -.0083 |
| | 0178 | 0.989 | .3207 | -.3750 | -.0014 | -0.024 | -.0119 |
| 1.00 | -06.0 | -0.329 | .0487 | .1476 | .0055 | -0.013 | -.0075 |
| | -01.7 | -0.076 | .0185 | .0350 | .0011 | -0.008 | -.0091 |
| | 0001 | 0.014 | .0200 | -.0035 | -.0010 | -0.006 | -.0094 |
| | 0020 | 0.118 | .0198 | -.0478 | -.0036 | -0.009 | -.0089 |
| | 0061 | 0.361 | .0531 | -.1550 | -.0072 | -0.013 | -.0078 |
| | 0101 | 0.602 | .1194 | -.2569 | -.0098 | -0.021 | -.0068 |
| | 0140 | 0.807 | .2132 | -.3416 | -.0101 | -0.026 | -.0067 |
| | 0179 | 0.994 | .3292 | -.4189 | -.0108 | -0.027 | -.0083 |
| 1.10 | -06.0 | -0.324 | .0477 | .1506 | .0065 | -0.012 | -.0069 |
| | -01.6 | -0.084 | .0202 | .0421 | .0015 | -0.008 | -.0084 |
| | 0001 | -0.009 | .0188 | .0101 | -.0006 | -0.008 | -.0086 |
| | 0020 | 0.088 | .0192 | -.0303 | -.0035 | -0.007 | -.0089 |
| | 0061 | 0.315 | .0482 | -.1333 | -.0058 | -0.013 | -.0076 |
| | 0100 | 0.558 | .1101 | -.2377 | -.0094 | -0.020 | -.0066 |
| | 0142 | 0.742 | .1992 | -.3101 | -.0086 | -0.024 | -.0075 |
| | 0179 | 0.913 | .3048 | -.3852 | -.0098 | -0.028 | -.0076 |
| 1.30 | -06.0 | -0.278 | .0409 | .1235 | .0046 | -0.012 | -.0086 |
| | -01.8 | -0.079 | .0168 | .0364 | .0013 | -0.009 | -.0088 |
| | 0001 | 0.003 | .0149 | .0007 | -.0004 | -0.008 | -.0092 |
| | 0020 | 0.087 | .0170 | -.0351 | -.0026 | -0.009 | -.0089 |
| | 0060 | 0.281 | .0413 | -.1197 | -.0054 | -0.013 | -.0086 |
| | 0099 | 0.468 | .0916 | -.1984 | -.0064 | -0.020 | -.0083 |
| | 0141 | 0.650 | .1703 | -.2714 | -.0068 | -0.026 | -.0091 |
| | 0178 | 0.808 | .2648 | -.3321 | -.0066 | -0.028 | -.0119 |
| 1.70 | -06.0 | -0.228 | .0373 | .0959 | .0029 | -0.015 | -.0096 |
| | -01.8 | -0.072 | .0168 | .0310 | .0008 | -0.011 | -.0098 |
| | -00.0 | -0.006 | .0149 | .0040 | -.0005 | -0.011 | -.0100 |
| | 0020 | 0.066 | .0171 | -.0262 | -.0020 | -0.011 | -.0098 |
| | 0060 | 0.216 | .0358 | -.0882 | -.0039 | -0.015 | -.0096 |
| | 0099 | 0.360 | .0750 | -.1429 | -.0044 | -0.022 | -.0102 |
| | 0140 | 0.494 | .1331 | -.1861 | -.0051 | -0.029 | -.0116 |
| | 0177 | 0.617 | .2051 | -.2142 | -.0057 | -0.033 | -.0151 |
| 2.22 | -05.9 | -0.164 | .0298 | .0614 | .0017 | -0.017 | -.0097 |
| | -01.8 | -0.043 | .0147 | .0165 | .0002 | -0.012 | -.0098 |
| | 0001 | 0.012 | .0137 | -.0045 | -.0005 | -0.012 | -.0099 |
| | 0020 | 0.067 | .0159 | -.0259 | -.0013 | -0.013 | -.0098 |
| | 0060 | 0.186 | .0324 | -.0682 | -.0027 | -0.018 | -.0100 |
| | 0100 | 0.302 | .0652 | -.1019 | -.0040 | -0.026 | -.0115 |
| | 0140 | 0.413 | .1147 | -.1239 | -.0050 | -0.037 | -.0133 |
| | 0178 | 0.518 | .1766 | -.1439 | -.0057 | -0.041 | -.0150 |

TABLE IV.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 0^{\circ}$

(a) BV

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -0.63 | -0.0009 | 0.0080 | -0.0189 | -0.0001 | 0.0000 | 0.0006 |
| | -0.42 | -0.0006 | 0.0074 | -0.0121 | -0.0000 | 0.0000 | 0.0004 |
| | -0.23 | -0.0002 | 0.0073 | -0.0078 | -0.0000 | 0.0000 | 0.0002 |
| | -0.09 | -0.0002 | 0.0068 | -0.0019 | 0.0000 | 0.0001 | -0.0001 |
| | -0.03 | 0.0002 | 0.0071 | -0.0014 | 0.0000 | 0.0001 | -0.0001 |
| | 0.02 | -0.0000 | 0.0070 | 0.0008 | 0.0001 | 0.0001 | -0.0002 |
| | 0.17 | 0.0002 | 0.0071 | 0.0056 | 0.0001 | 0.0001 | -0.0002 |
| | 0.38 | 0.0006 | 0.0070 | 0.0118 | 0.0001 | 0.0001 | -0.0004 |
| | 0.57 | 0.0008 | 0.0070 | 0.0178 | 0.0000 | 0.0001 | -0.0006 |
| | 0.78 | 0.0015 | 0.0092 | 0.0229 | 0.0001 | 0.0001 | -0.0006 |
| | 0.97 | 0.0021 | 0.0106 | 0.0289 | 0.0001 | 0.0000 | -0.0004 |
| | 1.18 | 0.0028 | 0.0126 | 0.0359 | 0.0001 | 0.0000 | -0.0007 |
| | 1.38 | 0.0037 | 0.0161 | 0.0429 | 0.0002 | 0.0001 | -0.0008 |
| | 1.58 | 0.0047 | 0.0192 | 0.0497 | -0.0000 | 0.0001 | -0.0007 |
| | 1.78 | 0.0058 | 0.0238 | 0.0574 | -0.0002 | 0.0002 | 0.0001 |
| 0.90 | -0.60 | -0.0011 | 0.0080 | -0.0174 | -0.0000 | 0.0001 | 0.0001 |
| | -0.40 | -0.0004 | 0.0070 | -0.0132 | 0.0000 | 0.0000 | 0.0002 |
| | -0.21 | -0.0001 | 0.0069 | -0.0072 | 0.0001 | 0.0001 | 0.0000 |
| | -0.07 | 0.0000 | 0.0068 | -0.0027 | 0.0000 | 0.0001 | -0.0002 |
| | -0.01 | 0.0001 | 0.0069 | -0.0008 | 0.0000 | 0.0001 | -0.0001 |
| | 0.04 | 0.0001 | 0.0068 | 0.0012 | 0.0000 | 0.0001 | -0.0003 |
| | 0.20 | 0.0002 | 0.0069 | 0.0062 | 0.0000 | 0.0001 | -0.0004 |
| | 0.40 | 0.0006 | 0.0071 | 0.0125 | 0.0001 | 0.0001 | -0.0005 |
| | 0.60 | 0.0010 | 0.0079 | 0.0175 | 0.0001 | 0.0001 | -0.0005 |
| | 0.79 | 0.0015 | 0.0088 | 0.0238 | 0.0002 | 0.0000 | -0.0004 |
| | 0.99 | 0.0022 | 0.0105 | 0.0294 | 0.0001 | 0.0001 | -0.0007 |
| | 1.20 | 0.0031 | 0.0132 | 0.0364 | 0.0002 | 0.0003 | -0.0009 |
| | 1.40 | 0.0039 | 0.0159 | 0.0436 | 0.0002 | 0.0002 | -0.0009 |
| | 1.60 | 0.0049 | 0.0201 | 0.0519 | 0.0002 | 0.0002 | -0.0009 |
| | 1.81 | 0.0063 | 0.0254 | 0.0603 | 0.0078 | 0.0001 | -0.0001 |
| 0.95 | -0.60 | -0.0004 | 0.0076 | -0.0213 | -0.0000 | 0.0000 | 0.0004 |
| | -0.38 | -0.0000 | 0.0071 | -0.0142 | 0.0000 | 0.0000 | -0.0000 |
| | -0.19 | 0.0002 | 0.0074 | -0.0083 | 0.0000 | 0.0001 | -0.0000 |
| | -0.04 | 0.0003 | 0.0077 | -0.0030 | -0.0000 | -0.0000 | 0.0000 |
| | 0.02 | 0.0003 | 0.0086 | -0.0009 | 0.0000 | 0.0001 | -0.0002 |
| | 0.06 | -0.0002 | 0.0074 | 0.0015 | 0.0000 | 0.0001 | -0.0002 |
| | 0.21 | 0.0001 | 0.0086 | 0.0074 | 0.0001 | 0.0001 | -0.0002 |
| | 0.43 | 0.0004 | 0.0079 | 0.0146 | 0.0001 | 0.0001 | -0.0004 |
| | 0.61 | 0.0007 | 0.0086 | 0.0199 | 0.0001 | 0.0002 | -0.0007 |
| | 0.82 | 0.0014 | 0.0106 | 0.0248 | 0.0001 | 0.0002 | -0.0007 |
| | 1.02 | 0.0019 | 0.0115 | 0.0326 | 0.0001 | 0.0002 | -0.0009 |
| | 1.21 | 0.0029 | 0.0145 | 0.0387 | 0.0001 | 0.0001 | -0.0008 |
| | 1.41 | 0.0039 | 0.0170 | 0.0462 | 0.0002 | 0.0002 | -0.0011 |
| | 1.60 | 0.0052 | 0.0221 | 0.0527 | 0.0001 | 0.0002 | -0.0009 |
| | 1.82 | 0.0064 | 0.0279 | 0.0628 | -0.0000 | 0.0001 | -0.0004 |
| 1.00 | -0.57 | -0.0009 | 0.0126 | -0.0193 | 0.0001 | 0.0000 | 0.0000 |
| | -0.38 | -0.0006 | 0.0107 | -0.0131 | 0.0000 | 0.0000 | 0.0000 |
| | -0.17 | -0.0004 | 0.0096 | -0.0062 | 0.0000 | 0.0000 | -0.0002 |
| | -0.03 | -0.0001 | 0.0132 | -0.0018 | 0.0000 | 0.0001 | -0.0002 |
| | 0.03 | -0.0000 | 0.0114 | 0.0006 | 0.0000 | 0.0001 | -0.0004 |
| | 0.09 | -0.0002 | 0.0088 | 0.0027 | 0.0000 | 0.0001 | -0.0004 |
| | 0.22 | -0.0002 | 0.0113 | 0.0080 | 0.0000 | 0.0001 | -0.0005 |
| | 0.63 | 0.0009 | 0.0137 | 0.0187 | 0.0001 | 0.0002 | -0.0007 |
| | 0.83 | 0.0011 | 0.0118 | 0.0266 | 0.0001 | 0.0001 | -0.0006 |
| | 1.03 | 0.0018 | 0.0147 | 0.0331 | 0.0001 | 0.0002 | -0.0008 |
| | 1.24 | 0.0029 | 0.0191 | 0.0392 | 0.0002 | 0.0001 | -0.0008 |
| | 1.43 | 0.0036 | 0.0176 | 0.0485 | 0.0001 | 0.0004 | -0.0012 |
| | 1.63 | 0.0049 | 0.0275 | 0.0550 | 0.0002 | 0.0004 | -0.0012 |
| | 1.84 | 0.0064 | 0.0285 | 0.0639 | 0.0001 | 0.0004 | -0.0012 |
| 1.05 | -0.59 | -0.0014 | 0.0138 | -0.0166 | -0.0000 | -0.0001 | 0.0001 |
| | -0.38 | -0.0007 | 0.0120 | -0.0116 | -0.0000 | -0.0000 | 0.0000 |
| | -0.18 | -0.0004 | 0.0117 | -0.0066 | -0.0000 | 0.0000 | -0.0002 |
| | -0.04 | -0.0004 | 0.0117 | -0.0003 | 0.0000 | -0.0000 | -0.0002 |
| | 0.07 | 0.0001 | 0.0117 | 0.0012 | 0.0000 | 0.0001 | -0.0002 |
| | 0.01 | -0.0001 | 0.0121 | 0.0001 | -0.0000 | -0.0000 | -0.0002 |
| | 0.22 | -0.0001 | 0.0114 | 0.0064 | -0.0001 | 0.0000 | -0.0002 |
| | 0.42 | 0.0003 | 0.0118 | 0.0136 | 0.0000 | 0.0001 | -0.0004 |
| | 0.62 | 0.0007 | 0.0125 | 0.0189 | 0.0001 | 0.0000 | -0.0004 |
| | 0.81 | 0.0010 | 0.0131 | 0.0257 | 0.0001 | 0.0001 | -0.0006 |
| | 1.03 | 0.0023 | 0.0153 | 0.0311 | 0.0001 | 0.0002 | -0.0006 |
| | 1.23 | 0.0029 | 0.0185 | 0.0378 | 0.0001 | 0.0000 | -0.0005 |
| | 1.41 | 0.0038 | 0.0219 | 0.0453 | 0.0001 | 0.0000 | -0.0005 |
| | 1.63 | 0.0052 | 0.0264 | 0.0545 | 0.0000 | 0.0001 | -0.0008 |
| | 1.82 | 0.0064 | 0.0314 | 0.0640 | 0.0001 | 0.0001 | -0.0009 |
| 1.10 | -0.60 | -0.0012 | 0.0133 | -0.0154 | 0.0001 | 0.0001 | -0.0005 |
| | -0.39 | -0.0010 | 0.0126 | -0.0106 | 0.0002 | 0.0001 | -0.0007 |
| | -0.19 | -0.0007 | 0.0119 | -0.0042 | 0.0001 | 0.0001 | -0.0009 |
| | -0.05 | -0.0005 | 0.0122 | -0.0002 | 0.0001 | 0.0001 | -0.0008 |
| | 0.01 | -0.0004 | 0.0123 | 0.0015 | 0.0001 | 0.0001 | -0.0008 |
| | 0.06 | -0.0004 | 0.0116 | 0.0034 | 0.0001 | 0.0005 | -0.0010 |
| | 0.20 | -0.0006 | 0.0119 | 0.0085 | 0.0001 | 0.0005 | -0.0013 |
| | 0.41 | 0.0000 | 0.0120 | 0.0133 | 0.0001 | 0.0005 | -0.0010 |
| | 0.62 | 0.0006 | 0.0128 | 0.0196 | 0.0001 | 0.0005 | -0.0010 |
| | 0.81 | 0.0013 | 0.0139 | 0.0238 | 0.0001 | 0.0005 | -0.0012 |
| | 1.00 | 0.0019 | 0.0156 | 0.0302 | 0.0001 | 0.0004 | -0.0011 |
| | 1.21 | 0.0027 | 0.0178 | 0.0388 | 0.0000 | 0.0004 | -0.0009 |
| | 1.42 | 0.0038 | 0.0215 | 0.0451 | 0.0001 | 0.0004 | -0.0012 |
| | 1.62 | 0.0050 | 0.0262 | 0.0531 | 0.0001 | 0.0004 | -0.0011 |
| | 1.82 | 0.0062 | 0.0321 | 0.0631 | 0.0002 | 0.0004 | -0.0015 |

TABLE IV.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 0^{\circ}$ - Continued
(a) BV - Concluded

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 1.30 | -0.60 | -0.018 | .0106 | -.0179 | .0003 | 0.003 | -.0009 |
| | -0.40 | -0.006 | .0095 | -.0127 | .0003 | 0.003 | -.0010 |
| | -0.19 | -0.003 | .0092 | -.0065 | .0003 | 0.004 | -.0011 |
| | -0.06 | -0.001 | .0090 | -.0023 | .0003 | 0.003 | -.0011 |
| | 0.00 | -0.000 | .0091 | -.0005 | .0003 | 0.004 | -.0012 |
| | 0.05 | 0.000 | .0090 | .0010 | .0003 | 0.002 | -.0007 |
| | 0.19 | 0.004 | .0090 | .0051 | .0002 | 0.002 | -.0008 |
| | 0.41 | 0.007 | .0092 | .0120 | .0002 | 0.002 | -.0007 |
| | 0.61 | 0.012 | .0101 | .0172 | .0002 | 0.002 | -.0007 |
| | 0.79 | 0.016 | .0112 | .0228 | .0002 | 0.002 | -.0008 |
| | 1.00 | 0.025 | .0133 | .0297 | .0002 | 0.002 | -.0011 |
| | 1.20 | 0.034 | .0159 | .0374 | .0002 | 0.002 | -.0010 |
| | 1.40 | 0.044 | .0195 | .0458 | .0002 | 0.002 | -.0010 |
| | 1.61 | 0.057 | .0246 | .0550 | .0003 | 0.002 | -.0013 |
| | 1.81 | 0.070 | .0311 | .0663 | .0003 | 0.003 | -.0012 |
| 1.50 | -0.61 | -0.011 | .0110 | -.0191 | .0002 | 0.002 | -.0006 |
| | -0.40 | -0.006 | .0099 | -.0125 | .0002 | 0.003 | -.0008 |
| | -0.20 | -0.003 | .0094 | -.0065 | .0002 | 0.003 | -.0009 |
| | -0.06 | -0.000 | .0092 | -.0026 | .0002 | 0.003 | -.0010 |
| | -0.00 | 0.000 | .0094 | -.0003 | .0002 | 0.003 | -.0011 |
| | 0.05 | 0.002 | .0092 | .0004 | .0002 | 0.003 | -.0011 |
| | 0.19 | 0.003 | .0092 | .0052 | .0002 | 0.003 | -.0012 |
| | 0.39 | 0.008 | .0095 | .0114 | .0003 | 0.003 | -.0012 |
| | 0.59 | 0.013 | .0101 | .0176 | .0003 | 0.003 | -.0015 |
| | 0.79 | 0.019 | .0118 | .0236 | .0003 | 0.004 | -.0018 |
| | 0.99 | 0.027 | .0140 | .0305 | .0003 | 0.003 | -.0018 |
| | 1.19 | 0.036 | .0168 | .0383 | .0003 | 0.003 | -.0019 |
| | 1.39 | 0.048 | .0208 | .0473 | .0004 | 0.003 | -.0020 |
| | 1.60 | 0.063 | .0269 | .0575 | .0003 | 0.003 | -.0019 |
| | 1.80 | 0.083 | .0357 | .0704 | .0005 | 0.002 | -.0020 |
| 1.70 | -0.61 | -0.014 | .0115 | -.0185 | .0001 | 0.002 | -.0004 |
| | -0.40 | -0.008 | .0100 | -.0124 | .0001 | 0.002 | -.0005 |
| | -0.21 | -0.005 | .0095 | -.0065 | .0001 | 0.002 | -.0006 |
| | -0.07 | -0.002 | .0096 | -.0019 | .0001 | 0.002 | -.0007 |
| | -0.01 | -0.001 | .0095 | .0000 | .0001 | 0.002 | -.0006 |
| | 0.03 | -0.001 | .0095 | .0014 | .0001 | 0.002 | -.0006 |
| | 0.19 | 0.001 | .0094 | .0072 | .0001 | 0.002 | -.0006 |
| | 0.39 | 0.005 | .0096 | .0133 | .0001 | 0.002 | -.0007 |
| | 0.59 | 0.010 | .0107 | .0195 | .0002 | 0.002 | -.0009 |
| | 0.79 | 0.017 | .0121 | .0257 | .0001 | 0.002 | -.0011 |
| | 0.99 | 0.026 | .0138 | .0337 | .0002 | 0.002 | -.0011 |
| | 1.19 | 0.037 | .0171 | .0420 | .0002 | 0.002 | -.0013 |
| | 1.39 | 0.051 | .0220 | .0519 | .0002 | 0.003 | -.0014 |
| | 1.60 | 0.070 | .0296 | .0639 | .0002 | 0.002 | -.0013 |
| | 1.79 | 0.092 | .0395 | .0779 | .0003 | 0.002 | -.0015 |
| 1.90 | -0.60 | -0.015 | .0107 | -.0169 | .0000 | 0.001 | -.0003 |
| | -0.40 | -0.010 | .0096 | -.0101 | -.0000 | 0.001 | -.0004 |
| | -0.21 | -0.006 | .0091 | -.0050 | .0000 | 0.002 | -.0005 |
| | -0.05 | -0.003 | .0088 | .0003 | .0000 | 0.002 | -.0006 |
| | 0.01 | -0.002 | .0088 | .0015 | .0000 | 0.001 | -.0005 |
| | 0.05 | -0.002 | .0086 | .0037 | .0000 | 0.002 | -.0006 |
| | 0.19 | -0.001 | .0086 | .0083 | .0000 | 0.001 | -.0006 |
| | 0.39 | 0.004 | .0090 | .0146 | .0000 | 0.001 | -.0006 |
| | 0.60 | 0.009 | .0093 | .0210 | .0001 | 0.001 | -.0008 |
| | 0.81 | 0.017 | .0115 | .0277 | .0001 | 0.001 | -.0008 |
| | 1.01 | 0.028 | .0140 | .0354 | .0001 | 0.001 | -.0010 |
| | 1.21 | 0.039 | .0173 | .0453 | .0001 | 0.001 | -.0010 |
| | 1.40 | 0.057 | .0233 | .0558 | .0002 | 0.001 | -.0011 |
| | 1.61 | 0.078 | .0320 | .0688 | .0003 | 0.001 | -.0014 |
| | 1.81 | 0.102 | .0428 | .0825 | .0003 | 0.002 | -.0016 |
| 2.22 | -0.58 | -0.017 | .0105 | -.0168 | -.0001 | 0.001 | -.0002 |
| | -0.37 | -0.011 | .0093 | -.0107 | -.0000 | 0.001 | -.0002 |
| | -0.16 | -0.005 | .0086 | -.0042 | -.0001 | 0.001 | -.0004 |
| | -0.02 | -0.003 | .0084 | .0006 | -.0000 | 0.002 | -.0005 |
| | 0.08 | -0.001 | .0083 | .0036 | .0000 | 0.002 | -.0006 |
| | 0.23 | 0.001 | .0084 | .0090 | .0000 | 0.002 | -.0007 |
| | 0.43 | 0.005 | .0087 | .0157 | .0000 | 0.002 | -.0008 |
| | 0.64 | 0.012 | .0102 | .0221 | .0000 | 0.001 | -.0008 |
| | 0.84 | 0.021 | .0117 | .0300 | .0000 | 0.001 | -.0009 |
| | 1.04 | 0.033 | .0148 | .0393 | .0001 | 0.001 | -.0009 |
| | 1.23 | 0.050 | .0196 | .0485 | .0001 | 0.001 | -.0010 |
| | 1.43 | 0.070 | .0266 | .0605 | .0002 | 0.000 | -.0012 |
| | 1.64 | 0.093 | .0361 | .0719 | .0002 | 0.000 | -.0014 |
| | 1.84 | 0.117 | .0484 | .0830 | .0002 | 0.001 | -.0015 |

TABLE IV.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 0^\circ$ - Continued

(b) BVC; $\delta = 0.2^\circ$

| M | $\alpha_j$ deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -0.63 | -0.041 | .0120 | -.0725 | -.0000 | -0.001 | .0010 |
| | -0.43 | -0.027 | .0097 | -.0477 | -.0000 | -0.000 | .0007 |
| | -0.23 | -0.014 | .0080 | -.0239 | -.0000 | 0.001 | .0003 |
| | -0.08 | -0.004 | .0074 | -.0095 | -.0000 | 0.001 | .0002 |
| | -0.03 | 0.000 | .0074 | -.0037 | .0000 | 0.001 | .0000 |
| | 0.002 | 0.003 | .0075 | .0002 | .0000 | 0.001 | .0000 |
| | 0.017 | 0.008 | .0076 | .0175 | .0000 | 0.001 | -.0002 |
| | 0.037 | 0.021 | .0087 | .0410 | .0000 | 0.001 | -.0002 |
| | 0.057 | 0.035 | .0109 | .0650 | .0001 | 0.000 | -.0003 |
| | 0.077 | 0.052 | .0141 | .0915 | .0001 | 0.000 | -.0005 |
| | 0.097 | 0.068 | .0184 | .1195 | .0002 | 0.001 | -.0009 |
| | 0.117 | 0.087 | .0247 | .1462 | .0002 | 0.003 | -.0015 |
| | 0.137 | 0.104 | .0319 | .1726 | .0004 | 0.004 | -.0020 |
| | 0.158 | 0.125 | .0417 | .2033 | .0006 | 0.003 | -.0017 |
| | 0.177 | 0.145 | .0520 | .2305 | .0010 | 0.005 | -.0028 |
| 0.90 | -0.61 | -0.040 | .0118 | -.0756 | .0000 | -0.001 | .0008 |
| | -0.41 | -0.028 | .0097 | -.0490 | .0000 | -0.000 | .0006 |
| | -0.21 | -0.013 | .0080 | -.0241 | .0000 | 0.001 | .0002 |
| | -0.06 | -0.003 | .0076 | -.0082 | .0000 | 0.001 | -.0001 |
| | -0.00 | 0.001 | .0075 | -.0024 | .0000 | 0.001 | -.0001 |
| | 0.004 | 0.001 | .0074 | .0037 | .0000 | 0.001 | -.0002 |
| | 0.019 | 0.010 | .0077 | .0198 | .0000 | 0.000 | -.0002 |
| | 0.039 | 0.024 | .0086 | .0434 | .0000 | 0.000 | -.0004 |
| | 0.059 | 0.040 | .0113 | .0708 | .0001 | 0.002 | -.0006 |
| | 0.079 | 0.056 | .0148 | .0976 | .0001 | 0.002 | -.0008 |
| | 0.100 | 0.073 | .0201 | .1263 | .0002 | 0.002 | -.0011 |
| | 0.119 | 0.093 | .0264 | .1535 | .0003 | 0.003 | -.0018 |
| | 0.140 | 0.112 | .0349 | .1834 | .0005 | 0.003 | -.0023 |
| | 0.160 | 0.132 | .0443 | .2091 | .0006 | 0.004 | -.0025 |
| | 0.180 | 0.147 | .0541 | .2371 | .0009 | 0.004 | -.0032 |
| 0.95 | -0.59 | -0.043 | .0128 | -.0730 | .0000 | -0.001 | .0006 |
| | -0.38 | -0.027 | .0105 | -.0462 | -.0000 | -0.000 | .0005 |
| | -0.19 | -0.013 | .0093 | -.0242 | -.0001 | 0.000 | .0002 |
| | -0.04 | -0.003 | .0086 | -.0080 | -.0000 | 0.001 | -.0000 |
| | 0.002 | -0.000 | .0083 | -.0007 | .0000 | 0.001 | -.0003 |
| | 0.007 | 0.004 | .0085 | .0024 | .0000 | 0.001 | -.0002 |
| | 0.021 | 0.012 | .0091 | .0203 | .0001 | 0.001 | -.0004 |
| | 0.042 | 0.027 | .0103 | .0458 | .0001 | -0.000 | -.0003 |
| | 0.061 | 0.039 | .0126 | .0711 | .0001 | 0.000 | -.0005 |
| | 0.081 | 0.058 | .0161 | .0976 | .0000 | -0.001 | -.0006 |
| | 0.101 | 0.076 | .0214 | .1271 | .0001 | -0.001 | -.0010 |
| | 0.122 | 0.095 | .0280 | .1551 | .0003 | 0.003 | -.0018 |
| | 0.142 | 0.110 | .0358 | .1823 | .0006 | 0.004 | -.0023 |
| | 0.162 | 0.131 | .0459 | .2111 | .0005 | 0.004 | -.0023 |
| | 0.182 | 0.152 | .0576 | .2388 | .0008 | 0.005 | -.0029 |
| 1.00 | -0.57 | -0.048 | .0157 | -.0709 | -.0000 | -0.001 | .0006 |
| | -0.37 | -0.031 | .0118 | -.0467 | -.0001 | -0.000 | .0003 |
| | -0.17 | -0.016 | .0130 | -.0214 | -.0000 | 0.000 | .0000 |
| | -0.02 | -0.006 | .0103 | -.0054 | -.0000 | 0.001 | -.0000 |
| | 0.003 | -0.001 | .0103 | -.0005 | .0000 | 0.001 | -.0003 |
| | 0.007 | -0.000 | .0106 | .0040 | -.0000 | -0.000 | -.0002 |
| | 0.022 | 0.006 | .0106 | .0224 | -.0000 | -0.000 | -.0003 |
| | 0.043 | 0.024 | .0147 | .0471 | -.0000 | -0.001 | -.0003 |
| | 0.063 | 0.038 | .0159 | .0719 | -.0000 | -0.001 | -.0004 |
| | 0.083 | 0.053 | .0172 | .0984 | -.0000 | -0.001 | -.0006 |
| | 0.103 | 0.069 | .0239 | .1253 | .0001 | 0.003 | -.0012 |
| | 0.122 | 0.087 | .0259 | .1507 | .0002 | 0.002 | -.0017 |
| | 0.143 | 0.107 | .0392 | .1777 | .0005 | 0.003 | -.0019 |
| | 0.163 | 0.123 | .0450 | .2049 | .0005 | 0.004 | -.0022 |
| | 0.183 | 0.145 | .0591 | .2296 | .0007 | 0.003 | -.0023 |
| 1.05 | -0.59 | -0.048 | .0185 | -.0733 | -.0000 | -0.001 | .0008 |
| | -0.38 | -0.031 | .0153 | -.0463 | -.0000 | 0.000 | .0004 |
| | -0.18 | -0.017 | .0133 | -.0224 | -.0001 | -0.000 | .0004 |
| | -0.03 | -0.007 | .0126 | -.0064 | -.0000 | -0.000 | .0002 |
| | 0.002 | -0.004 | .0125 | -.0009 | -.0000 | 0.001 | .0001 |
| | 0.017 | -0.002 | .0117 | .0052 | -.0000 | 0.001 | -.0000 |
| | 0.022 | 0.005 | .0132 | .0203 | -.0000 | 0.001 | -.0002 |
| | 0.042 | 0.020 | .0135 | .0448 | -.0000 | 0.000 | -.0003 |
| | 0.062 | 0.034 | .0162 | .0684 | -.0000 | -0.001 | -.0003 |
| | 0.082 | 0.052 | .0199 | .0931 | -.0000 | -0.001 | -.0004 |
| | 0.102 | 0.066 | .0234 | .1194 | .0000 | 0.003 | -.0009 |
| | 0.122 | 0.082 | .0290 | .1458 | .0002 | 0.001 | -.0014 |
| | 0.142 | 0.101 | .0370 | .1719 | .0004 | 0.002 | -.0016 |
| | 0.163 | 0.119 | .0475 | .1986 | .0004 | 0.002 | -.0018 |
| | 0.183 | 0.142 | .0593 | .2269 | .0007 | 0.002 | -.0021 |
| 1.10 | -0.59 | -0.046 | .0179 | -.0674 | .0001 | -0.000 | .0001 |
| | -0.39 | -0.031 | .0154 | -.0439 | .0002 | 0.001 | -.0001 |
| | -0.18 | -0.018 | .0133 | -.0203 | .0001 | 0.002 | -.0004 |
| | -0.04 | -0.008 | .0134 | -.0042 | .0001 | 0.002 | -.0006 |
| | 0.002 | -0.005 | .0125 | .0011 | .0001 | 0.002 | -.0007 |
| | 0.006 | -0.003 | .0127 | .0064 | .0001 | 0.002 | -.0006 |
| | 0.021 | 0.005 | .0128 | .0210 | .0001 | 0.000 | -.0005 |
| | 0.041 | 0.019 | .0138 | .0464 | .0001 | 0.000 | -.0007 |
| | 0.061 | 0.032 | .0156 | .0695 | .0000 | 0.002 | -.0006 |
| | 0.081 | 0.050 | .0196 | .0946 | .0000 | 0.002 | -.0008 |
| | 0.101 | 0.064 | .0245 | .1212 | .0000 | 0.002 | -.0011 |
| | 0.121 | 0.081 | .0305 | .1420 | .0002 | 0.003 | -.0016 |
| | 0.142 | 0.095 | .0384 | .1684 | .0004 | 0.003 | -.0020 |
| | 0.162 | 0.116 | .0489 | .1944 | .0004 | 0.003 | -.0021 |
| | 0.182 | 0.134 | .0589 | .2176 | .0006 | 0.003 | -.0023 |

TABLE IV.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 0^\circ$ - Continued
(b) BVC; $\delta = 0.2^\circ$ - Concluded

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 1.30 | -06.0 | -0.039 | .0144 | -.0693 | .0002 | -0.000 | .0001 |
| | -04.0 | -0.027 | .0121 | -.0455 | .0002 | 0.001 | -.0002 |
| | -02.0 | -0.013 | .0107 | -.0240 | .0002 | 0.002 | -.0005 |
| | -00.5 | -0.004 | .0098 | -.0088 | .0002 | 0.002 | -.0006 |
| | 00.1 | -0.001 | .0098 | -.0032 | .0002 | 0.002 | -.0007 |
| | 00.5 | 0.002 | .0098 | .0004 | .0002 | 0.002 | -.0007 |
| | 02.0 | 0.009 | .0102 | .0156 | .0002 | 0.001 | -.0006 |
| | 04.0 | 0.023 | .0112 | .0387 | .0002 | 0.002 | -.0007 |
| | 06.0 | 0.036 | .0134 | .0615 | .0002 | 0.002 | -.0005 |
| | 08.0 | 0.051 | .0165 | .0854 | .0002 | 0.001 | -.0006 |
| | 10.0 | 0.065 | .0212 | .1092 | .0002 | 0.001 | -.0006 |
| | 12.0 | 0.080 | .0268 | .1321 | .0002 | 0.001 | -.0011 |
| | 14.0 | 0.096 | .0343 | .1538 | .0002 | 0.001 | -.0012 |
| | 16.1 | 0.114 | .0425 | .1768 | .0004 | 0.003 | -.0012 |
| | 18.1 | 0.132 | .0530 | .2010 | .0006 | 0.002 | -.0014 |
| 1.50 | -06.1 | -0.037 | .0150 | -.0674 | .0002 | -0.000 | -.0001 |
| | -04.1 | -0.025 | .0125 | -.0447 | .0002 | 0.000 | -.0002 |
| | -02.1 | -0.013 | .0110 | -.0232 | .0002 | 0.001 | -.0005 |
| | -00.6 | -0.004 | .0104 | -.0090 | .0002 | 0.001 | -.0007 |
| | -00.0 | -0.001 | .0102 | -.0030 | .0002 | 0.002 | -.0008 |
| | 00.4 | 0.000 | .0101 | .0018 | .0002 | 0.003 | -.0009 |
| | 00.9 | 0.007 | .0103 | .0161 | .0002 | 0.003 | -.0010 |
| | 03.9 | 0.021 | .0111 | .0371 | .0002 | 0.002 | -.0010 |
| | 05.9 | 0.034 | .0134 | .0595 | .0002 | 0.002 | -.0012 |
| | 07.9 | 0.047 | .0163 | .0816 | .0003 | 0.002 | -.0014 |
| | 09.9 | 0.062 | .0212 | .1029 | .0003 | 0.002 | -.0016 |
| | 11.9 | 0.078 | .0272 | .1246 | .0004 | 0.002 | -.0020 |
| | 13.9 | 0.095 | .0346 | .1451 | .0003 | 0.002 | -.0020 |
| | 16.0 | 0.114 | .0442 | .1663 | .0006 | 0.003 | -.0021 |
| | 18.0 | 0.132 | .0546 | .1886 | .0007 | 0.002 | -.0023 |
| 1.70 | -06.2 | -0.035 | .0149 | -.0612 | .0001 | -0.001 | .0002 |
| | -04.1 | -0.026 | .0127 | -.0395 | .0001 | -0.000 | .0000 |
| | -02.0 | -0.012 | .0110 | -.0187 | .0001 | 0.001 | -.0003 |
| | -00.7 | -0.005 | .0105 | -.0062 | .0001 | 0.001 | -.0003 |
| | -00.1 | -0.002 | .0103 | -.0011 | .0001 | 0.001 | -.0003 |
| | 00.4 | -0.002 | .0102 | .0040 | .0001 | 0.000 | -.0003 |
| | 01.8 | 0.006 | .0104 | .0176 | .0001 | 0.001 | -.0005 |
| | 03.9 | 0.018 | .0114 | .0387 | .0001 | 0.001 | -.0006 |
| | 05.9 | 0.030 | .0133 | .0594 | .0001 | 0.001 | -.0006 |
| | 07.9 | 0.043 | .0163 | .0800 | .0001 | 0.001 | -.0006 |
| | 09.9 | 0.059 | .0209 | .1002 | .0002 | 0.001 | -.0010 |
| | 11.9 | 0.075 | .0269 | .1200 | .0003 | 0.001 | -.0014 |
| | 13.9 | 0.092 | .0342 | .1388 | .0001 | 0.001 | -.0014 |
| | 16.0 | 0.113 | .0443 | .1596 | .0004 | 0.002 | -.0015 |
| | 17.9 | 0.137 | .0566 | .1817 | .0004 | 0.003 | -.0015 |
| 1.90 | -05.9 | -0.036 | .0141 | -.0536 | .0000 | -0.001 | .0002 |
| | -04.0 | -0.025 | .0114 | -.0346 | .0000 | -0.000 | -.0000 |
| | -01.9 | -0.014 | .0103 | -.0157 | .0000 | 0.000 | -.0002 |
| | -00.5 | -0.005 | .0095 | -.0027 | .0000 | 0.000 | -.0003 |
| | -00.0 | -0.003 | .0096 | .0021 | .0000 | -0.000 | -.0003 |
| | 00.5 | -0.001 | .0092 | .0070 | .0000 | 0.002 | -.0005 |
| | 02.0 | 0.007 | .0098 | .0204 | .0000 | 0.001 | -.0004 |
| | 04.0 | 0.018 | .0105 | .0398 | .0000 | 0.001 | -.0004 |
| | 06.1 | 0.030 | .0126 | .0591 | .0000 | 0.000 | -.0005 |
| | 08.0 | 0.043 | .0158 | .0774 | .0000 | 0.000 | -.0006 |
| | 10.0 | 0.057 | .0201 | .0963 | .0001 | 0.001 | -.0009 |
| | 12.0 | 0.073 | .0261 | .1148 | .0002 | 0.001 | -.0012 |
| | 14.0 | 0.092 | .0339 | .1330 | .0001 | 0.000 | -.0011 |
| | 16.1 | 0.116 | .0449 | .1535 | .0001 | 0.001 | -.0011 |
| | 18.1 | 0.146 | .0595 | .1755 | .0005 | 0.001 | -.0018 |
| 2.22 | -05.7 | -0.036 | .0137 | -.0517 | -.0000 | -0.001 | .0004 |
| | -03.6 | -0.024 | .0114 | -.0387 | -.0001 | -0.000 | .0002 |
| | -02.9 | -0.013 | .0081 | -.0140 | -.0001 | -0.000 | -.0000 |
| | -00.2 | -0.004 | .0092 | -.0017 | -.0001 | -0.000 | -.0002 |
| | 00.4 | -0.003 | .0090 | .0052 | -.0001 | -0.001 | -.0000 |
| | 00.8 | -0.001 | .0090 | .0083 | -.0001 | -0.000 | -.0002 |
| | 00.3 | 0.006 | .0094 | .0214 | -.0001 | 0.002 | -.0005 |
| | 00.3 | 0.018 | .0103 | .0394 | -.0001 | 0.001 | -.0005 |
| | 00.3 | 0.029 | .0127 | .0577 | -.0000 | 0.000 | -.0005 |
| | 00.3 | 0.043 | .0160 | .0754 | .0000 | 0.001 | -.0006 |
| | 01.3 | 0.059 | .0205 | .0936 | .0001 | 0.000 | -.0008 |
| | 01.3 | 0.076 | .0270 | .1112 | .0001 | -0.000 | -.0010 |
| | 01.4 | 0.101 | .0367 | .1300 | -.0000 | 0.000 | -.0008 |
| | 01.4 | 0.129 | .0493 | .1500 | -.0002 | 0.001 | -.0008 |
| | 01.4 | 0.158 | .0640 | .1706 | -.0003 | 0.001 | -.0005 |

TABLE IV.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 0^\circ$ - Continued
(c) BVC; $\delta = 4.5^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -06.3 | -0.024 | .0102 | -.0396 | -.0001 | -0.002 | .0008 |
| | -02.3 | 0.001 | .0081 | -.0005 | .0000 | 0.000 | .0003 |
| | -00.2 | 0.013 | .0086 | .0221 | .0000 | -0.000 | .0001 |
| | 01.6 | 0.026 | .0098 | .0432 | .0001 | -0.000 | .0001 |
| | 05.7 | 0.057 | .0162 | .0959 | .0001 | 0.002 | -.0003 |
| | 09.7 | 0.089 | .0268 | .1510 | .0001 | 0.002 | -.0010 |
| | 13.7 | 0.128 | .0442 | .2095 | .0007 | 0.005 | -.0017 |
| | 17.7 | 0.165 | .0663 | .2606 | .0013 | 0.006 | -.0013 |
| 0.90 | -06.1 | -0.024 | .0100 | -.0412 | .0000 | -0.001 | .0006 |
| | -02.0 | 0.002 | .0078 | .0022 | .0000 | 0.001 | .0001 |
| | 00.0 | 0.015 | .0085 | .0251 | .0000 | 0.000 | -.0001 |
| | 02.0 | 0.029 | .0102 | .0492 | .0000 | 0.000 | -.0003 |
| | 06.0 | 0.061 | .0168 | .1031 | .0001 | 0.001 | -.0005 |
| | 10.0 | 0.095 | .0286 | .1582 | .0002 | 0.001 | -.0010 |
| | 13.9 | 0.132 | .0463 | .2139 | .0007 | 0.004 | -.0017 |
| | 18.0 | 0.164 | .0673 | .2692 | .0008 | 0.004 | -.0015 |
| 1.00 | -05.8 | -0.024 | .0142 | -.0405 | .0001 | 0.001 | -.0003 |
| | -01.7 | 0.000 | .0099 | .0039 | .0001 | 0.003 | -.0008 |
| | 00.3 | 0.014 | .0137 | .0274 | .0001 | 0.002 | -.0007 |
| | 00.3 | 0.027 | .0110 | .0506 | .0001 | 0.002 | -.0008 |
| | 00.3 | 0.062 | .0191 | .1024 | .0002 | 0.002 | -.0011 |
| | 01.3 | 0.095 | .0308 | .1571 | .0002 | 0.003 | -.0014 |
| | 14.2 | 0.130 | .0465 | .2084 | .0006 | 0.004 | -.0021 |
| | 18.3 | 0.169 | .0712 | .2567 | .0008 | 0.004 | -.0022 |
| 1.10 | -05.9 | -0.027 | .0157 | -.0366 | .0002 | 0.002 | -.0009 |
| | -01.8 | -0.001 | .0131 | .0039 | .0001 | 0.003 | -.0011 |
| | 00.2 | 0.012 | .0138 | .0273 | .0002 | 0.002 | -.0010 |
| | 00.1 | 0.024 | .0152 | .0501 | .0002 | 0.001 | -.0009 |
| | 06.2 | 0.055 | .0225 | .0990 | .0002 | 0.002 | -.0012 |
| | 10.1 | 0.087 | .0336 | .1468 | .0002 | 0.002 | -.0013 |
| | 14.2 | 0.120 | .0474 | .1961 | .0006 | 0.003 | -.0020 |
| | 18.2 | 0.152 | .0698 | .2444 | .0007 | 0.003 | -.0020 |
| 1.30 | -06.1 | -0.024 | .0127 | -.0399 | .0002 | 0.001 | -.0004 |
| | -01.9 | -0.000 | .0106 | .0003 | .0002 | 0.002 | -.0007 |
| | 00.1 | 0.013 | .0110 | .0212 | .0002 | 0.002 | -.0007 |
| | 01.9 | 0.026 | .0121 | .0415 | .0002 | 0.001 | -.0006 |
| | 06.0 | 0.055 | .0176 | .0886 | .0001 | 0.000 | -.0004 |
| | 10.0 | 0.083 | .0283 | .1342 | .0002 | -0.000 | -.0008 |
| | 14.0 | 0.116 | .0438 | .1779 | .0006 | 0.001 | -.0013 |
| | 18.1 | 0.146 | .0634 | .2219 | .0016 | -0.002 | -.0033 |
| 1.70 | -06.1 | -0.025 | .0133 | -.0345 | .0001 | 0.000 | -.0001 |
| | -02.1 | -0.000 | .0110 | .0024 | .0001 | 0.001 | -.0005 |
| | -00.1 | 0.010 | .0114 | .0220 | .0000 | 0.001 | -.0004 |
| | 01.8 | 0.020 | .0123 | .0406 | .0001 | 0.000 | -.0003 |
| | 05.9 | 0.045 | .0176 | .0817 | .0001 | -0.001 | -.0006 |
| | 09.9 | 0.070 | .0264 | .1200 | .0002 | -0.000 | -.0012 |
| | 13.9 | 0.101 | .0407 | .1571 | .0004 | 0.001 | -.0013 |
| | 17.9 | 0.141 | .0631 | .1952 | .0007 | 0.001 | -.0021 |
| 2.22 | -05.8 | -0.026 | .0123 | -.0305 | -.0001 | -0.001 | .0002 |
| | -01.7 | -0.000 | .0098 | .0050 | -.0001 | -0.000 | -.0002 |
| | 00.4 | 0.010 | .0102 | .0247 | -.0001 | -0.000 | -.0001 |
| | 00.3 | 0.020 | .0114 | .0412 | -.0000 | -0.000 | -.0003 |
| | 06.4 | 0.043 | .0163 | .0765 | .0001 | -0.000 | -.0006 |
| | 01.3 | 0.069 | .0257 | .1092 | .0001 | -0.000 | -.0007 |
| | 14.3 | 0.110 | .0423 | .1430 | .0001 | 0.001 | -.0006 |
| | 18.4 | 0.162 | .0700 | .1856 | -.0001 | 0.002 | -.0007 |

TABLE IV.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 0^\circ$ - Continued
(d) BVC; $\delta = 9.8^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -06.3 | -0.008 | .0091 | -.0134 | -.0001 | 0.000 | .0007 |
| | -02.2 | 0.015 | .0104 | .0300 | .0000 | 0.001 | .0003 |
| | -00.3 | 0.028 | .0123 | .0520 | .0001 | 0.001 | .0002 |
| | 01.6 | 0.041 | .0151 | .0769 | .0001 | 0.000 | .0001 |
| | 05.7 | 0.074 | .0245 | .1290 | .0001 | -0.000 | .0005 |
| | 09.7 | 0.110 | .0392 | .1873 | .0002 | 0.001 | -.0000 |
| | 13.7 | 0.141 | .0578 | .2489 | .0006 | 0.004 | -.0019 |
| | 17.8 | 0.158 | .0736 | .2646 | .0011 | 0.006 | -.0023 |
| 0.90 | -06.2 | -0.004 | .0091 | -.0132 | -.0000 | 0.000 | .0005 |
| | -04.1 | 0.005 | .0090 | .0089 | .0000 | 0.001 | .0003 |
| | -02.0 | 0.018 | .0109 | .0328 | .0000 | 0.001 | .0001 |
| | -00.0 | 0.030 | .0124 | .0569 | .0001 | 0.001 | .0002 |
| | 01.9 | 0.043 | .0156 | .0820 | .0001 | 0.000 | .0001 |
| | 05.9 | 0.077 | .0252 | .1342 | .0001 | -0.000 | .0003 |
| | 10.0 | 0.106 | .0388 | .1926 | .0001 | 0.001 | -.0005 |
| | 13.9 | 0.127 | .0526 | .2251 | .0009 | 0.005 | -.0023 |
| | 18.0 | 0.146 | .0677 | .2503 | .0016 | 0.008 | -.0037 |
| 1.00 | -05.8 | -0.006 | .0119 | -.0120 | -.0000 | 0.001 | -.0002 |
| | -01.8 | 0.018 | .0134 | .0326 | .0001 | 0.003 | -.0006 |
| | 00.3 | 0.031 | .0162 | .0565 | .0001 | 0.002 | -.0004 |
| | 02.2 | 0.045 | .0193 | .0801 | .0001 | 0.001 | -.0004 |
| | 06.2 | 0.075 | .0302 | .1320 | .0001 | -0.000 | -.0003 |
| | 10.2 | 0.110 | .0434 | .1873 | .0001 | -0.000 | -.0002 |
| | 14.3 | 0.137 | .0611 | .2374 | .0005 | 0.003 | -.0015 |
| | 18.3 | 0.170 | .0840 | .2823 | .0011 | 0.004 | -.0026 |
| 1.10 | -05.9 | -0.009 | .0141 | -.0091 | .0001 | 0.001 | -.0008 |
| | -01.8 | 0.014 | .0142 | .0331 | .0001 | 0.002 | -.0006 |
| | 00.1 | 0.027 | .0178 | .0551 | .0001 | 0.001 | -.0005 |
| | 02.1 | 0.040 | .0213 | .0792 | .0001 | 0.001 | -.0007 |
| | 06.1 | 0.067 | .0301 | .1274 | .0000 | 0.001 | -.0003 |
| | 10.1 | 0.096 | .0442 | .1781 | .0002 | 0.001 | -.0005 |
| | 14.2 | 0.123 | .0613 | .2198 | .0004 | 0.003 | -.0013 |
| | 18.2 | 0.155 | .0841 | .2638 | .0009 | 0.004 | -.0027 |
| 1.30 | -06.0 | -0.010 | .0121 | -.0128 | .0002 | 0.002 | -.0007 |
| | -02.0 | 0.015 | .0127 | .0278 | .0002 | 0.001 | -.0006 |
| | 00.1 | 0.027 | .0143 | .0491 | .0002 | 0.001 | -.0005 |
| | 02.0 | 0.040 | .0171 | .0691 | .0001 | 0.001 | -.0002 |
| | 06.0 | 0.068 | .0255 | .1128 | .0001 | -0.000 | .0002 |
| | 10.0 | 0.095 | .0377 | .1590 | .0001 | -0.000 | -.0003 |
| | 14.0 | 0.116 | .0518 | .1996 | .0004 | 0.001 | -.0015 |
| | 18.1 | 0.142 | .0710 | .2409 | .0012 | 0.002 | -.0027 |
| 1.70 | -06.1 | -0.011 | .0128 | -.0101 | .0000 | 0.001 | -.0003 |
| | -02.0 | 0.012 | .0130 | .0277 | .0001 | 0.001 | -.0003 |
| | -00.1 | 0.021 | .0145 | .0456 | .0000 | -0.000 | -.0001 |
| | 01.8 | 0.031 | .0167 | .0627 | .0000 | -0.000 | -.0001 |
| | 05.9 | 0.054 | .0235 | .0999 | .0000 | -0.000 | -.0003 |
| | 09.9 | 0.079 | .0345 | .1389 | .0001 | -0.000 | -.0007 |
| | 13.9 | 0.107 | .0494 | .1722 | .0005 | 0.001 | -.0020 |
| | 17.9 | 0.136 | .0691 | .2116 | .0003 | 0.005 | -.0018 |
| 2.22 | -05.7 | -0.013 | .0118 | -.0066 | -.0001 | 0.000 | .0000 |
| | -01.6 | 0.010 | .0119 | .0280 | -.0001 | -0.000 | -.0000 |
| | 00.4 | 0.020 | .0132 | .0450 | -.0001 | -0.000 | -.0000 |
| | 02.3 | 0.029 | .0153 | .0602 | -.0001 | -0.000 | -.0002 |
| | 06.3 | 0.050 | .0217 | .0929 | -.0000 | -0.000 | -.0003 |
| | 10.3 | 0.073 | .0316 | .1246 | .0000 | -0.000 | -.0004 |
| | 14.3 | 0.108 | .0481 | .1565 | .0002 | -0.000 | -.0012 |
| | 18.4 | 0.153 | .0739 | .1990 | .0002 | 0.002 | -.0019 |

TABLE IV.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 0^\circ$ - Concluded

(e) BVC; $\delta = 19.8^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -06.3 | 0.024 | .0162 | .0394 | -.0001 | 0.000 | .0008 |
| | -02.3 | 0.048 | .0221 | .0823 | -.0000 | 0.001 | .0005 |
| | -00.2 | 0.060 | .0279 | .1070 | .0000 | 0.000 | .0004 |
| | 01.6 | 0.071 | .0322 | .1272 | .0001 | 0.000 | .0001 |
| | 05.7 | 0.103 | .0469 | .1758 | -.0001 | 0.001 | .0011 |
| | 09.7 | 0.124 | .0610 | .2117 | .0001 | 0.001 | -.0005 |
| | 13.8 | 0.132 | .0698 | .2252 | .0009 | 0.010 | .0003 |
| | 17.9 | 0.143 | .0826 | .2361 | .0012 | 0.008 | -.0019 |
| 0.90 | -06.2 | 0.023 | .0167 | .0408 | -.0001 | 0.000 | .0006 |
| | -02.0 | 0.052 | .0236 | .0865 | .0000 | 0.001 | .0004 |
| | 00.0 | 0.062 | .0283 | .1101 | .0001 | 0.001 | .0002 |
| | 01.9 | 0.074 | .0334 | .1318 | .0001 | -0.000 | -.0001 |
| | 06.0 | 0.103 | .0476 | .1770 | -.0003 | -0.000 | .0017 |
| | 09.9 | 0.114 | .0563 | .1944 | .0001 | 0.001 | -.0002 |
| | 14.0 | 0.128 | .0681 | .2232 | .0004 | 0.004 | -.0012 |
| | 18.0 | 0.145 | .0836 | .2462 | .0010 | 0.007 | -.0020 |
| 1.00 | -05.7 | 0.025 | .0199 | .0422 | .0001 | 0.000 | .0002 |
| | -01.7 | 0.052 | .0286 | .0859 | .0001 | -0.000 | .0001 |
| | 00.3 | 0.060 | .0289 | .1087 | .0001 | 0.000 | -.0003 |
| | 02.3 | 0.070 | .0376 | .1316 | .0002 | -0.001 | -.0009 |
| | 06.4 | 0.101 | .0503 | .1745 | .0001 | 0.001 | .0002 |
| | 10.3 | 0.123 | .0650 | .2168 | .0002 | -0.000 | -.0002 |
| | 14.2 | 0.143 | .0800 | .2460 | .0004 | 0.002 | -.0017 |
| | 18.3 | 0.164 | .0993 | .2764 | .0007 | 0.003 | -.0011 |
| 1.10 | -06.0 | 0.021 | .0212 | .0414 | .0001 | 0.003 | -.0005 |
| | -01.8 | 0.044 | .0285 | .0840 | .0002 | 0.002 | -.0007 |
| | 00.2 | 0.054 | .0333 | .1047 | .0002 | 0.002 | -.0007 |
| | 02.1 | 0.065 | .0384 | .1257 | .0003 | 0.001 | -.0013 |
| | 06.2 | 0.091 | .0510 | .1638 | .0001 | 0.002 | -.0004 |
| | 10.1 | 0.109 | .0647 | .2000 | .0000 | -0.000 | -.0000 |
| | 14.2 | 0.130 | .0801 | .2331 | .0003 | 0.001 | -.0009 |
| | 18.2 | 0.149 | .0997 | .2535 | .0013 | 0.004 | -.0026 |
| 1.30 | -05.9 | 0.021 | .0179 | .0356 | .0002 | 0.002 | -.0003 |
| | -01.9 | 0.044 | .0233 | .0724 | .0001 | 0.001 | .0001 |
| | 00.1 | 0.054 | .0269 | .0914 | .0002 | 0.001 | -.0003 |
| | 02.0 | 0.063 | .0318 | .1101 | .0002 | 0.001 | -.0004 |
| | 06.1 | 0.089 | .0435 | .1473 | .0001 | -0.000 | .0000 |
| | 10.0 | 0.108 | .0564 | .1825 | .0002 | -0.000 | -.0003 |
| | 14.1 | 0.123 | .0718 | .2157 | .0006 | 0.001 | -.0023 |
| | 17.9 | 0.144 | .0891 | .2417 | .0016 | 0.005 | -.0034 |
| 1.70 | -06.1 | 0.011 | .0184 | .0296 | .0000 | 0.000 | -.0001 |
| | -02.1 | 0.033 | .0221 | .0615 | .0000 | -0.000 | -.0001 |
| | -00.1 | 0.042 | .0255 | .0792 | .0000 | -0.001 | -.0003 |
| | 01.8 | 0.050 | .0288 | .0949 | .0000 | 0.000 | -.0000 |
| | 05.8 | 0.072 | .0382 | .1258 | .0000 | -0.001 | -.0003 |
| | 09.8 | 0.085 | .0495 | .1578 | .0002 | 0.000 | -.0016 |
| | 13.9 | 0.105 | .0648 | .1890 | .0005 | 0.002 | -.0017 |
| | 17.9 | 0.140 | .0878 | .2271 | .0009 | 0.002 | -.0027 |
| 2.22 | -05.8 | 0.007 | .0168 | .0254 | -.0001 | -0.000 | .0001 |
| | -01.7 | 0.028 | .0203 | .0576 | -.0001 | -0.001 | -.0000 |
| | 00.4 | 0.036 | .0232 | .0735 | -.0000 | -0.001 | -.0000 |
| | 02.3 | 0.044 | .0263 | .0868 | -.0000 | -0.001 | -.0002 |
| | 06.4 | 0.064 | .0351 | .1143 | -.0000 | -0.001 | -.0003 |
| | 10.3 | 0.083 | .0462 | .1418 | .0000 | -0.000 | -.0003 |
| | 14.4 | 0.116 | .0647 | .1748 | .0001 | 0.002 | -.0010 |
| | 18.4 | 0.157 | .0919 | .2152 | .0005 | 0.001 | -.0019 |

TABLE V.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 5^{\circ}$
(a) BV

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -05.9 | -0.012 | .0119 | -.0167 | -.0093 | -0.060 | .0227 |
| | -01.9 | -0.003 | .0097 | -.0054 | -.0085 | -0.055 | .0210 |
| | 0001 | -0.000 | .0101 | .0004 | -.0081 | -0.054 | .0199 |
| | 0021 | 0.003 | .0097 | .0067 | -.0076 | -0.052 | .0185 |
| | 0061 | 0.011 | .0108 | .0188 | -.0069 | -0.050 | .0165 |
| | 0101 | 0.022 | .0128 | .0313 | -.0064 | -0.045 | .0136 |
| | 0140 | 0.039 | .0174 | .0430 | -.0062 | -0.041 | .0099 |
| | 0180 | 0.061 | .0260 | .0574 | -.0061 | -0.033 | .0058 |
| 0.90 | -05.9 | -0.012 | .0119 | -.0164 | -.0098 | -0.061 | .0244 |
| | -02.0 | -0.005 | .0106 | -.0051 | -.0091 | -0.058 | .0229 |
| | 0002 | -0.000 | .0102 | .0010 | -.0086 | -0.055 | .0211 |
| | 0020 | 0.003 | .0102 | .0070 | -.0081 | -0.054 | .0201 |
| | 0062 | 0.011 | .0107 | .0198 | -.0072 | -0.051 | .0175 |
| | 0100 | 0.023 | .0128 | .0318 | -.0067 | -0.046 | .0143 |
| | 0140 | 0.041 | .0177 | .0446 | -.0063 | -0.041 | .0097 |
| | 0179 | 0.065 | .0269 | .0603 | -.0062 | -0.034 | .0049 |
| 1.00 | -06.0 | -0.012 | .0147 | -.0173 | -.0116 | -0.071 | .0306 |
| | -01.8 | -0.004 | .0120 | -.0049 | -.0099 | -0.064 | .0261 |
| | 0001 | -0.001 | .0150 | .0014 | -.0097 | -0.062 | .0254 |
| | 0022 | 0.001 | .0111 | .0100 | -.0088 | -0.058 | .0229 |
| | 0061 | 0.010 | .0142 | .0216 | -.0081 | -0.057 | .0208 |
| | 0101 | 0.024 | .0168 | .0342 | -.0073 | -0.052 | .0165 |
| | 0140 | 0.042 | .0218 | .0476 | -.0068 | -0.041 | .0103 |
| | 0179 | 0.067 | .0312 | .0647 | -.0066 | -0.031 | .0045 |
| 1.10 | -05.9 | -0.015 | .0177 | -.0150 | -.0111 | -0.067 | .0290 |
| | -02.0 | -0.008 | .0158 | -.0038 | -.0100 | -0.063 | .0266 |
| | 0002 | -0.007 | .0159 | .0038 | -.0094 | -0.060 | .0246 |
| | 0021 | -0.001 | .0156 | .0092 | -.0088 | -0.057 | .0228 |
| | 0061 | 0.008 | .0166 | .0208 | -.0080 | -0.054 | .0203 |
| | 0101 | 0.024 | .0192 | .0328 | -.0074 | -0.046 | .0158 |
| | 0140 | 0.042 | .0244 | .0473 | -.0068 | -0.038 | .0090 |
| | 0180 | 0.066 | .0346 | .0628 | -.0066 | -0.027 | .0017 |
| 1.30 | -05.9 | -0.015 | .0149 | -.0160 | -.0100 | -0.059 | .0249 |
| | -01.9 | -0.006 | .0131 | -.0048 | -.0091 | -0.056 | .0227 |
| | 0001 | -0.002 | .0126 | .0013 | -.0085 | -0.053 | .0211 |
| | 0022 | 0.002 | .0125 | .0077 | -.0079 | -0.052 | .0195 |
| | 0061 | 0.012 | .0134 | .0192 | -.0071 | -0.048 | .0163 |
| | 0101 | 0.027 | .0162 | .0320 | -.0066 | -0.042 | .0112 |
| | 0140 | 0.048 | .0222 | .0458 | -.0060 | -0.034 | .0037 |
| | 0179 | 0.076 | .0334 | .0641 | -.0054 | -0.027 | -.0036 |
| 1.70 | -06.1 | -0.021 | .0162 | -.0163 | -.0078 | -0.053 | .0179 |
| | -01.9 | -0.009 | .0134 | -.0035 | -.0076 | -0.049 | .0171 |
| | 0002 | -0.004 | .0131 | .0030 | -.0074 | -0.048 | .0164 |
| | 0020 | 0.001 | .0128 | .0085 | -.0072 | -0.047 | .0155 |
| | 0060 | 0.012 | .0137 | .0208 | -.0065 | -0.045 | .0121 |
| | 0101 | 0.031 | .0173 | .0348 | -.0058 | -0.039 | .0058 |
| | 0141 | 0.059 | .0260 | .0533 | -.0050 | -0.033 | -.0020 |
| | 0180 | 0.102 | .0436 | .0780 | -.0036 | -0.026 | -.0118 |
| 2.22 | -05.9 | -0.021 | .0143 | -.0151 | -.0057 | -0.045 | .0106 |
| | -02.0 | -0.009 | .0120 | -.0025 | -.0055 | -0.041 | .0100 |
| | 0001 | -0.003 | .0116 | .0035 | -.0054 | -0.039 | .0093 |
| | 0021 | 0.001 | .0113 | .0106 | -.0053 | -0.039 | .0085 |
| | 0060 | 0.015 | .0128 | .0232 | -.0049 | -0.038 | .0057 |
| | 0101 | 0.040 | .0176 | .0404 | -.0043 | -0.036 | -.0005 |
| | 0140 | 0.078 | .0301 | .0615 | -.0031 | -0.037 | -.0072 |
| | 0181 | 0.123 | .0518 | .0835 | -.0015 | -0.037 | -.0128 |

TABLE V.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 5^\circ$ - Continued
(b) BVC; $\delta = 0.2^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -05.9 | -0.050 | .0166 | -.0650 | -.0085 | -0.054 | .0209 |
| | -01.9 | -0.020 | .0123 | -.0173 | -.0083 | -0.055 | .0202 |
| | -00.1 | -0.006 | .0116 | .0005 | -.0083 | -0.057 | .0206 |
| | 00.1 | 0.013 | .0118 | .0199 | -.0083 | -0.057 | .0210 |
| | 00.6.0 | 0.044 | .0156 | .0679 | -.0083 | -0.048 | .0191 |
| | 01.0.0 | 0.074 | .0224 | .1208 | -.0051 | -0.027 | .0070 |
| | 01.4.0 | 0.110 | .0357 | .1770 | -.0015 | -0.016 | -.0027 |
| | 01.8.0 | 0.152 | .0571 | .2390 | -.0009 | -0.014 | -.0017 |
| 0.90 | -06.0 | -0.052 | .0170 | -.0703 | -.0090 | -0.054 | .0227 |
| | -03.2 | -0.017 | .0101 | -.0174 | -.0086 | -0.056 | .0216 |
| | 00.0.1 | 0.001 | .0116 | .0020 | -.0088 | -0.058 | .0223 |
| | 00.2.0 | 0.013 | .0120 | .0209 | -.0087 | -0.058 | .0225 |
| | 00.6.1 | 0.049 | .0161 | .0737 | -.0086 | -0.048 | .0201 |
| | 01.0.1 | 0.083 | .0235 | .1302 | -.0050 | -0.024 | .0062 |
| | 01.4.0 | 0.118 | .0375 | .1860 | -.0015 | -0.013 | -.0027 |
| | 01.8.1 | 0.157 | .0583 | .2472 | -.0005 | -0.007 | -.0020 |
| 1.00 | -05.9 | -0.046 | .0219 | -.0661 | -.0106 | -0.065 | .0284 |
| | -01.9 | -0.014 | .0143 | -.0184 | -.0098 | -0.064 | .0257 |
| | -00.0 | -0.002 | .0164 | .0041 | -.0100 | -0.066 | .0266 |
| | 00.2.0 | 0.013 | .0166 | .0242 | -.0100 | -0.066 | .0269 |
| | 00.6.1 | 0.047 | .0177 | .0766 | -.0095 | -0.052 | .0229 |
| | 01.0.1 | 0.077 | .0265 | .1320 | -.0051 | -0.025 | .0064 |
| | 01.4.0 | 0.114 | .0401 | .1874 | -.0016 | -0.011 | -.0029 |
| | 01.8.0 | 0.152 | .0586 | .2419 | .0007 | -0.010 | -.0050 |
| 1.10 | -06.0 | -0.051 | .0242 | -.0644 | -.0103 | -0.062 | .0276 |
| | -01.9 | -0.018 | .0195 | -.0162 | -.0098 | -0.062 | .0256 |
| | 00.0.1 | -0.005 | .0179 | .0041 | -.0098 | -0.064 | .0261 |
| | 00.2.1 | 0.010 | .0189 | .0256 | -.0098 | -0.063 | .0265 |
| | 00.6.0 | 0.041 | .0210 | .0722 | -.0092 | -0.050 | .0216 |
| | 01.0.1 | 0.072 | .0291 | .1238 | -.0050 | -0.026 | .0061 |
| | 01.4.0 | 0.108 | .0427 | .1742 | -.0022 | -0.012 | -.0026 |
| | 01.8.0 | 0.143 | .0623 | .2252 | -.0000 | -0.013 | -.0064 |
| 1.30 | -06.0 | -0.047 | .0197 | -.0625 | -.0091 | -0.054 | .0233 |
| | -01.9 | -0.018 | .0149 | -.0168 | -.0088 | -0.055 | .0220 |
| | 00.0.1 | -0.002 | .0143 | .0007 | -.0088 | -0.056 | .0222 |
| | 00.2.1 | 0.014 | .0147 | .0192 | -.0087 | -0.056 | .0221 |
| | 00.6.0 | 0.044 | .0180 | .0648 | -.0081 | -0.043 | .0170 |
| | 01.0.0 | 0.075 | .0254 | .1130 | -.0050 | -0.026 | .0064 |
| | 01.3.9 | 0.108 | .0387 | .1568 | -.0027 | -0.019 | .0018 |
| | 01.8.0 | 0.143 | .0590 | .2053 | .0006 | -0.022 | -.0036 |
| 1.70 | -06.1 | -0.046 | .0198 | -.0561 | -.0074 | -0.050 | .0175 |
| | -01.9 | -0.017 | .0152 | -.0140 | -.0075 | -0.050 | .0168 |
| | 00.0.1 | -0.001 | .0144 | .0032 | -.0075 | -0.050 | .0169 |
| | 00.1.9 | 0.009 | .0147 | .0204 | -.0076 | -0.050 | .0169 |
| | 00.6.0 | 0.041 | .0177 | .0626 | -.0066 | -0.038 | .0105 |
| | 01.0.0 | 0.068 | .0251 | .1041 | -.0042 | -0.027 | .0016 |
| | 01.4.1 | 0.103 | .0393 | .1441 | -.0020 | -0.020 | -.0051 |
| | 01.7.9 | 0.144 | .0608 | .1861 | .0031 | -0.021 | -.0130 |
| 2.22 | -06.1 | -0.044 | .0187 | -.0487 | -.0054 | -0.044 | .0111 |
| | -01.9 | -0.018 | .0137 | -.0100 | -.0055 | -0.042 | .0102 |
| | 00.0.1 | -0.001 | .0129 | .0048 | -.0055 | -0.042 | .0101 |
| | 00.2.1 | 0.010 | .0133 | .0235 | -.0055 | -0.041 | .0096 |
| | 00.6.1 | 0.039 | .0166 | .0608 | -.0049 | -0.034 | .0049 |
| | 01.0.1 | 0.069 | .0247 | .0975 | -.0034 | -0.027 | -.0017 |
| | 01.4.0 | 0.115 | .0415 | .1323 | -.0011 | -0.024 | -.0075 |
| | 01.8.0 | 0.166 | .0682 | .1711 | .0023 | -0.027 | -.0115 |

TABLE V.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 5^\circ$ - Continued
(c) BVC; $\delta = 10.2^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -05.9 | -0.013 | .0133 | -.0095 | -.0091 | -0.056 | .0202 |
| | -01.9 | 0.018 | .0146 | .0327 | -.0093 | -0.064 | .0225 |
| | 0001 | 0.034 | .0166 | .0556 | -.0095 | -0.066 | .0242 |
| | 0022 | 0.051 | .0202 | .0810 | -.0098 | -0.067 | .0262 |
| | 0061 | 0.086 | .0293 | .1303 | -.0096 | -0.053 | .0237 |
| | 0100 | 0.116 | .0410 | .1878 | -.0051 | -0.017 | .0057 |
| | 0139 | 0.135 | .0538 | .2295 | -.0014 | 0.003 | .0026 |
| | 0180 | 0.155 | .0698 | .2599 | .0025 | 0.010 | .0057 |
| 0.90 | -06.0 | -0.012 | .0138 | -.0090 | -.0098 | -0.059 | .0225 |
| | -02.0 | 0.019 | .0149 | .0360 | -.0098 | -0.067 | .0248 |
| | 0001 | 0.036 | .0178 | .0612 | -.0101 | -0.071 | .0268 |
| | 0021 | 0.055 | .0211 | .0842 | -.0104 | -0.070 | .0283 |
| | 0062 | 0.091 | .0310 | .1392 | -.0097 | -0.053 | .0244 |
| | 0100 | 0.121 | .0418 | .1930 | -.0052 | -0.014 | .0072 |
| | 0139 | 0.140 | .0541 | .2328 | -.0012 | 0.008 | .0055 |
| | 0181 | 0.159 | .0710 | .2652 | .0026 | 0.011 | .0019 |
| 1.00 | -05.9 | -0.008 | .0192 | -.0084 | -.0117 | -0.068 | .0286 |
| | -01.9 | 0.020 | .0180 | .0379 | -.0110 | -0.073 | .0290 |
| | 0001 | 0.037 | .0233 | .0609 | -.0114 | -0.076 | .0313 |
| | 0020 | 0.053 | .0238 | .0842 | -.0116 | -0.076 | .0326 |
| | 0061 | 0.089 | .0349 | .1359 | -.0110 | -0.059 | .0288 |
| | 0101 | 0.116 | .0430 | .1916 | -.0050 | -0.016 | .0060 |
| | 0140 | 0.142 | .0614 | .2427 | -.0006 | 0.003 | -.0023 |
| | 0180 | 0.166 | .0798 | .2857 | .0023 | 0.005 | -.0008 |
| 1.10 | -06.1 | -0.014 | .0200 | -.0101 | -.0115 | -0.067 | .0285 |
| | -02.0 | 0.016 | .0214 | .0362 | -.0110 | -0.070 | .0285 |
| | 0001 | 0.034 | .0240 | .0591 | -.0111 | -0.073 | .0301 |
| | 0021 | 0.047 | .0267 | .0820 | -.0112 | -0.072 | .0309 |
| | 0060 | 0.079 | .0356 | .1265 | -.0104 | -0.054 | .0256 |
| | 0101 | 0.104 | .0449 | .1788 | -.0049 | -0.017 | .0049 |
| | 0140 | 0.129 | .0606 | .2260 | -.0010 | 0.002 | -.0028 |
| | 0180 | 0.153 | .0801 | .2691 | .0020 | 0.004 | -.0037 |
| 1.30 | -06.0 | -0.016 | .0174 | -.0093 | -.0100 | -0.058 | .0233 |
| | -01.9 | 0.017 | .0178 | .0327 | -.0101 | -0.065 | .0253 |
| | -00.0 | 0.031 | .0194 | .0521 | -.0103 | -0.067 | .0272 |
| | 0020 | 0.045 | .0224 | .0713 | -.0107 | -0.068 | .0291 |
| | 0060 | 0.077 | .0302 | .1154 | -.0098 | -0.051 | .0284 |
| | 0101 | 0.105 | .0409 | .1620 | -.0057 | -0.021 | .0098 |
| | 0140 | 0.128 | .0554 | .2054 | -.0026 | -0.007 | .0050 |
| | 0180 | 0.142 | .0712 | .2543 | .0018 | -0.001 | .0032 |
| 1.70 | -06.0 | -0.020 | .0177 | -.0069 | -.0078 | -0.050 | .0163 |
| | -01.9 | 0.012 | .0174 | .0317 | -.0081 | -0.055 | .0181 |
| | 0001 | 0.025 | .0191 | .0493 | -.0083 | -0.057 | .0191 |
| | 0021 | 0.039 | .0216 | .0676 | -.0084 | -0.058 | .0194 |
| | 0060 | 0.065 | .0271 | .1034 | -.0071 | -0.036 | .0101 |
| | 0101 | 0.091 | .0377 | .1425 | -.0047 | -0.019 | .0042 |
| | 0140 | 0.117 | .0521 | .1814 | -.0015 | -0.004 | -.0021 |
| | 0180 | 0.153 | .0746 | .2151 | .0038 | -0.009 | -.0092 |
| 2.22 | -06.0 | -0.020 | .0161 | -.0057 | -.0058 | -0.041 | .0097 |
| | -01.9 | 0.008 | .0157 | .0296 | -.0059 | -0.045 | .0105 |
| | 0001 | 0.021 | .0169 | .0460 | -.0060 | -0.045 | .0107 |
| | 0021 | 0.034 | .0190 | .0616 | -.0061 | -0.043 | .0104 |
| | 0061 | 0.061 | .0249 | .0942 | -.0053 | -0.029 | .0044 |
| | 0100 | 0.089 | .0352 | .1289 | -.0041 | -0.019 | .0008 |
| | 0139 | 0.121 | .0514 | .1613 | -.0011 | -0.015 | -.0064 |
| | 0180 | 0.168 | .0772 | .1992 | .0006 | -0.007 | -.0095 |

TABLE V.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 5^{\circ}$ - Continued
(d) BC; $\delta = 0.2^{\circ}$

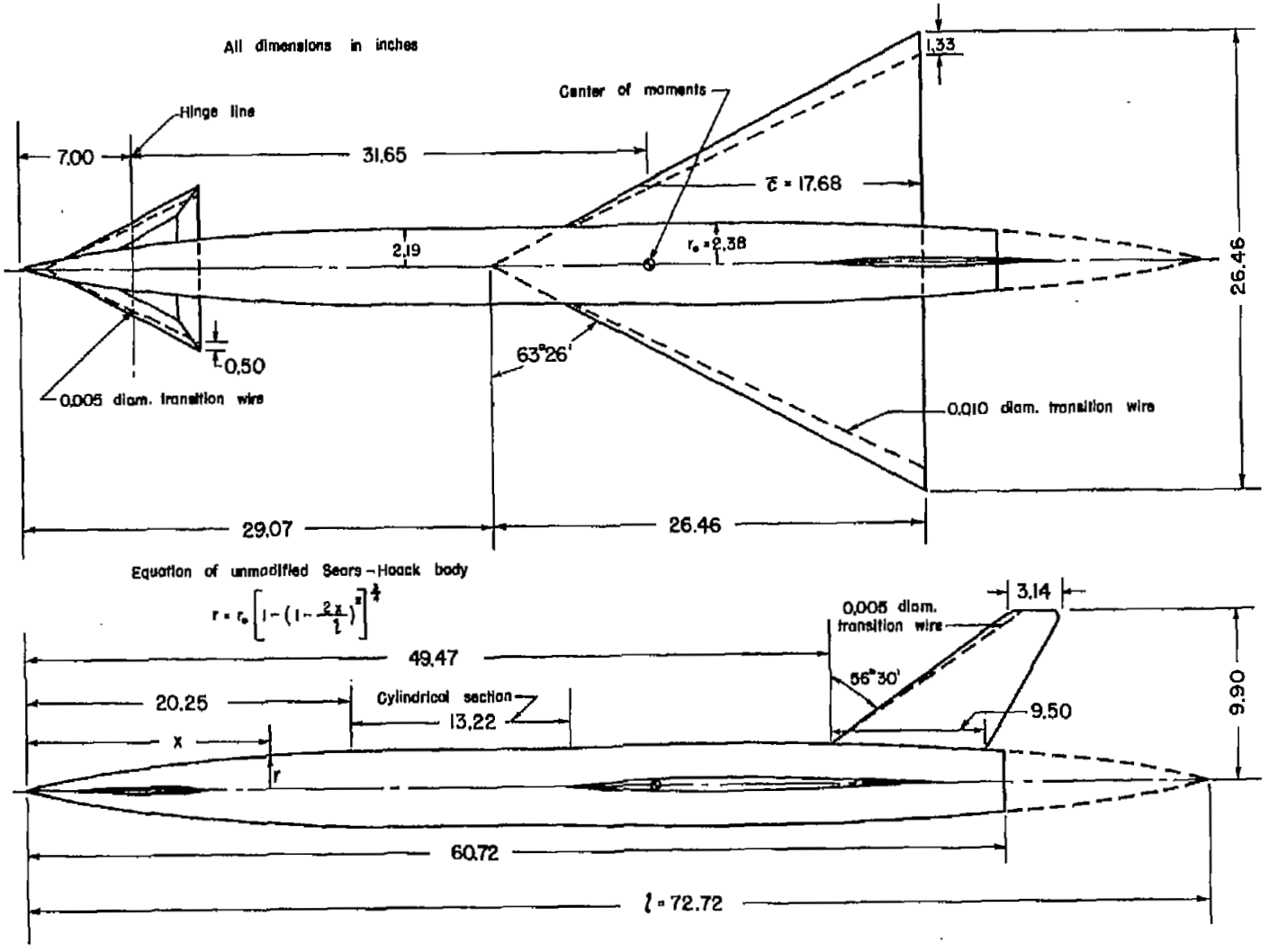
| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -06.0 | -0.048 | .0122 | -.0696 | .0003 | -0.003 | -.0092 |
| | -02.0 | -0.017 | .0077 | -.0208 | .0001 | -0.003 | -.0103 |
| | 0001 | 0.001 | .0070 | -.0009 | .0000 | -0.004 | -.0104 |
| | 0020 | 0.009 | .0075 | .0204 | -.0000 | -0.005 | -.0102 |
| | 0060 | 0.040 | .0108 | .0700 | -.0001 | -0.003 | -.0094 |
| | 0101 | 0.071 | .0194 | .1254 | -.0002 | -0.007 | -.0076 |
| | 0140 | 0.105 | .0335 | .1798 | -.0004 | -0.013 | -.0051 |
| | 0180 | 0.144 | .0545 | .2415 | -.0002 | -0.021 | .0018 |
| 0.90 | -05.9 | -0.046 | .0116 | -.0705 | .0002 | -0.004 | -.0092 |
| | -02.0 | -0.014 | .0075 | -.0203 | .0001 | -0.005 | -.0103 |
| | 0001 | -0.001 | .0067 | .0021 | -.0000 | -0.005 | -.0104 |
| | 0020 | 0.011 | .0075 | .0227 | -.0000 | -0.005 | -.0103 |
| | 0060 | 0.044 | .0111 | .0754 | -.0001 | -0.004 | -.0092 |
| | 0101 | 0.077 | .0207 | .1328 | -.0002 | -0.005 | -.0075 |
| | 0140 | 0.112 | .0353 | .1875 | -.0003 | -0.009 | -.0050 |
| | 0180 | 0.149 | .0559 | .2489 | -.0002 | -0.016 | .0027 |
| 1.00 | -06.0 | -0.048 | .0175 | -.0682 | .0002 | -0.001 | -.0104 |
| | -02.0 | -0.012 | .0082 | -.0189 | -.0000 | -0.003 | -.0114 |
| | -00.0 | 0.003 | .0092 | .0024 | -.0000 | -0.003 | -.0114 |
| | 0021 | 0.015 | .0083 | .0256 | .0000 | -0.004 | -.0113 |
| | 0060 | 0.046 | .0153 | .0770 | -.0001 | -0.003 | -.0102 |
| | 0101 | 0.078 | .0243 | .1333 | -.0001 | -0.006 | -.0079 |
| | 0141 | 0.112 | .0394 | .1888 | -.0002 | -0.010 | -.0042 |
| | 0180 | 0.149 | .0608 | .2440 | -.0002 | -0.024 | .0008 |
| 1.10 | -061 | -0.049 | .0175 | -.0665 | .0002 | -0.001 | -.0101 |
| | -032 | -0.015 | .0082 | -.0183 | .0000 | -0.003 | -.0107 |
| | 0001 | -0.003 | .0117 | .0039 | -.0001 | -0.004 | -.0107 |
| | 0021 | 0.013 | .0121 | .0256 | .0000 | -0.005 | -.0104 |
| | 0061 | 0.040 | .0164 | .0727 | -.0002 | -0.003 | -.0098 |
| | 0100 | 0.069 | .0261 | .1240 | -.0002 | -0.007 | -.0076 |
| | 0140 | 0.105 | .0415 | .1761 | -.0002 | -0.010 | -.0053 |
| | 0181 | 0.137 | .0612 | .2293 | -.0002 | -0.027 | .0011 |
| 1.30 | -06.0 | -0.044 | .0146 | -.0668 | .0002 | -0.007 | -.0090 |
| | -02.0 | -0.015 | .0100 | -.0200 | .0001 | -0.006 | -.0099 |
| | 0001 | -0.001 | .0094 | .0014 | -.0000 | -0.006 | -.0101 |
| | 0020 | 0.011 | .0102 | .0209 | -.0000 | -0.006 | -.0101 |
| | 0061 | 0.042 | .0137 | .0663 | -.0001 | -0.005 | -.0093 |
| | 0101 | 0.072 | .0234 | .1147 | -.0001 | -0.008 | -.0075 |
| | 0139 | 0.102 | .0367 | .1584 | -.0001 | -0.015 | -.0034 |
| | 0180 | 0.138 | .0576 | .2076 | -.0002 | -0.036 | .0046 |
| 1.70 | -061 | -0.043 | .0151 | -.0592 | .0001 | -0.009 | -.0102 |
| | -020 | -0.014 | .0108 | -.0166 | .0000 | -0.009 | -.0109 |
| | 0001 | -0.002 | .0103 | .0027 | -.0000 | -0.009 | -.0111 |
| | 0021 | 0.011 | .0107 | .0216 | -.0000 | -0.009 | -.0111 |
| | 0061 | 0.039 | .0147 | .0634 | -.0001 | -0.008 | -.0107 |
| | 0101 | 0.067 | .0235 | .1056 | -.0001 | -0.013 | -.0091 |
| | 0140 | 0.078 | | .1451 | -.0001 | -0.020 | -.0061 |
| | 0180 | 0.144 | .0618 | .1877 | -.0001 | -0.039 | -.0015 |
| 2.22 | -061 | -0.039 | .0141 | -.0528 | .0001 | -0.012 | -.0100 |
| | -019 | -0.012 | .0096 | -.0141 | -.0000 | -0.010 | -.0108 |
| | 0001 | -0.001 | .0091 | .0039 | -.0001 | -0.010 | -.0109 |
| | 0020 | 0.010 | .0097 | .0212 | -.0001 | -0.010 | -.0109 |
| | 0061 | 0.038 | .0139 | .0607 | -.0001 | -0.012 | -.0104 |
| | 0099 | 0.066 | .0225 | .0973 | -.0001 | -0.018 | -.0086 |
| | 0141 | 0.114 | .0414 | .1347 | -.0002 | -0.027 | -.0068 |
| | 0180 | 0.163 | .0671 | .1726 | -.0002 | -0.036 | -.0052 |

TABLE V.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS AT $\beta = 5^\circ$ - Continued
(e) BC; $\delta = 9.6^\circ$

| M | $\alpha$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -06.0 | -0.013 | .0073 | -.0145 | .0001 | 0.008 | -.0107 |
| | -01.9 | 0.017 | .0089 | .0289 | .0001 | -0.004 | -.0112 |
| | 00.1 | 0.033 | .0113 | .0506 | -.0000 | -0.008 | -.0111 |
| | 00.9 | 0.048 | .0147 | .0728 | -.0000 | -0.010 | -.0112 |
| | 00.2 | 0.083 | .0251 | .1290 | -.0000 | -0.013 | -.0107 |
| | 01.01 | 0.111 | .0399 | .1855 | -.0000 | -0.020 | -.0079 |
| | 01.41 | 0.137 | .0565 | .2280 | .0001 | -0.026 | -.0005 |
| | 01.80 | 0.158 | .0751 | .2597 | .0007 | -0.047 | .0154 |
| 0.90 | -05.9 | -0.011 | .0072 | -.0125 | .0001 | 0.005 | -.0109 |
| | -02.0 | 0.019 | .0090 | .0314 | .0001 | -0.005 | -.0113 |
| | -00.0 | 0.036 | .0117 | .0540 | .0001 | -0.009 | -.0113 |
| | 00.20 | 0.052 | .0151 | .0780 | .0001 | -0.010 | -.0114 |
| | 00.60 | 0.085 | .0254 | .1322 | .0001 | -0.011 | -.0111 |
| | 01.00 | 0.116 | .0401 | .1889 | .0000 | -0.014 | -.0071 |
| | 01.40 | 0.145 | .0573 | .2320 | .0006 | -0.019 | .0044 |
| | 01.80 | 0.157 | .0741 | .2614 | .0004 | -0.042 | .0142 |
| 1.00 | -06.0 | -0.011 | .0103 | -.0119 | .0000 | 0.016 | -.0113 |
| | -01.9 | 0.017 | .0143 | .0340 | -.0000 | -0.002 | -.0116 |
| | 00.1 | 0.033 | .0143 | .0566 | -.0001 | -0.008 | -.0118 |
| | 00.21 | 0.049 | .0205 | .0810 | .0000 | -0.014 | -.0121 |
| | 00.61 | 0.084 | .0298 | .1331 | .0000 | -0.021 | -.0111 |
| | 01.01 | 0.109 | .0458 | .1899 | -.0001 | -0.033 | -.0081 |
| | 01.41 | 0.140 | .0644 | .2405 | -.0001 | -0.051 | -.0013 |
| | 01.80 | 0.163 | .0853 | .2812 | .0000 | -0.070 | .0069 |
| 1.10 | -06.0 | -0.014 | .0123 | -.0122 | .0001 | 0.015 | -.0107 |
| | -01.9 | 0.014 | .0140 | .0320 | -.0000 | -0.003 | -.0109 |
| | 00.1 | 0.028 | .0176 | .0555 | -.0001 | -0.009 | -.0111 |
| | 00.20 | 0.045 | .0212 | .0765 | -.0000 | -0.013 | -.0116 |
| | 00.60 | 0.075 | .0310 | .1253 | -.0000 | -0.019 | -.0112 |
| | 01.01 | 0.101 | .0464 | .1774 | -.0001 | -0.034 | -.0078 |
| | 01.40 | 0.127 | .0642 | .2223 | -.0001 | -0.049 | -.0021 |
| | 01.80 | 0.155 | .0867 | .2653 | -.0001 | -0.075 | .0076 |
| 1.30 | -06.1 | -0.014 | .0108 | -.0141 | .0001 | 0.001 | -.0110 |
| | -01.9 | 0.017 | .0119 | .0285 | .0000 | -0.007 | -.0109 |
| | 00.1 | 0.031 | .0141 | .0484 | -.0000 | -0.010 | -.0107 |
| | 00.21 | 0.046 | .0167 | .0692 | -.0000 | -0.011 | -.0109 |
| | 00.61 | 0.077 | .0264 | .1135 | -.0000 | -0.012 | -.0110 |
| | 01.01 | 0.104 | .0391 | .1592 | .0000 | -0.013 | -.0078 |
| | 01.80 | 0.155 | .0773 | .2405 | -.0000 | -0.041 | .0100 |
| 1.70 | -06.0 | -0.016 | .0117 | -.0113 | -.0000 | -0.001 | -.0116 |
| | -02.1 | 0.010 | .0124 | .0254 | -.0000 | -0.009 | -.0116 |
| | 00.1 | 0.027 | .0144 | .0445 | -.0000 | -0.012 | -.0115 |
| | 00.21 | 0.040 | .0169 | .0626 | -.0000 | -0.013 | -.0120 |
| | 00.60 | 0.067 | .0248 | .1004 | .0000 | -0.014 | -.0126 |
| | 01.00 | 0.090 | .0363 | .1402 | .0000 | -0.016 | -.0088 |
| | 01.40 | 0.116 | .0526 | .1787 | -.0000 | -0.028 | -.0022 |
| | 01.80 | 0.155 | .0778 | .2132 | -.0000 | -0.048 | .0012 |
| 2.22 | -06.0 | -0.017 | .0106 | -.0112 | -.0001 | -0.001 | -.0110 |
| | -01.9 | 0.009 | .0110 | .0249 | -.0002 | -0.009 | -.0111 |
| | 00.1 | 0.022 | .0124 | .0415 | -.0002 | -0.012 | -.0114 |
| | 00.21 | 0.034 | .0152 | .0581 | -.0001 | -0.014 | -.0119 |
| | 00.60 | 0.059 | .0225 | .0910 | -.0002 | -0.017 | -.0120 |
| | 01.01 | 0.086 | .0347 | .1272 | -.0002 | -0.024 | -.0092 |
| | 01.40 | 0.123 | .0532 | .1599 | -.0002 | -0.044 | -.0052 |
| | 01.79 | 0.168 | .0789 | .1954 | -.0001 | -0.045 | -.0021 |

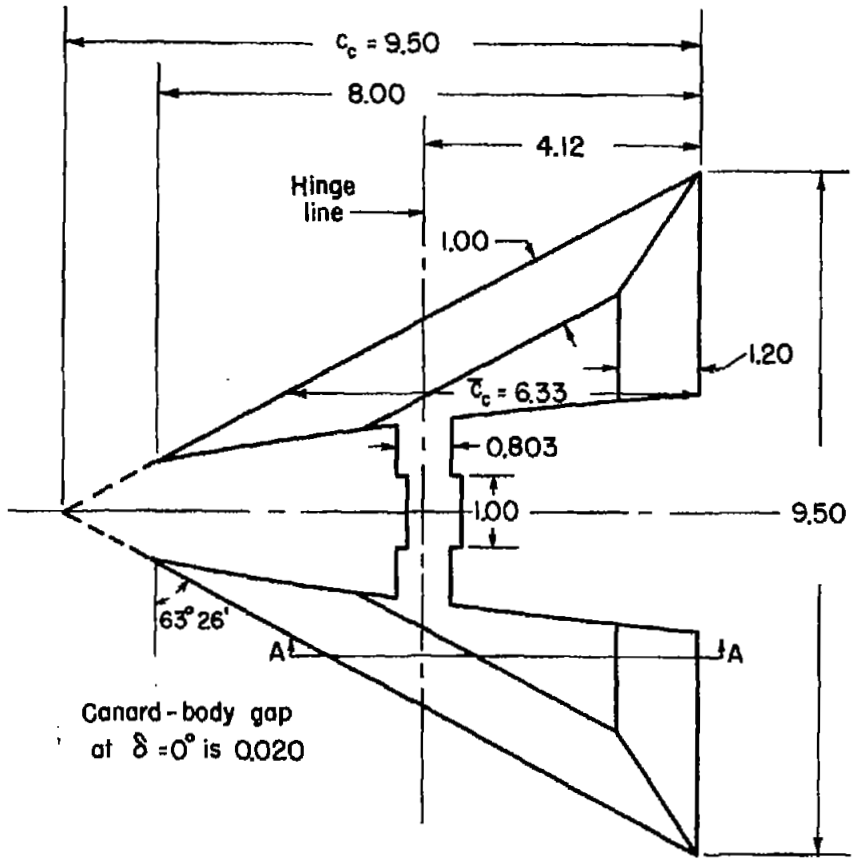
TABLE V.- AERODYNAMIC CHARACTERISTICS OF WING-OFF CONFIGURATIONS
AT $\beta = 5^{\circ}$ - Concluded
(f) B

| M | $\alpha_j$, deg | $C_L$ | $C_D$ | $C_m$ | $C_l$ | $C_Y$ | $C_n$ |
|---|---|---|---|---|---|---|---|
| 0.70 | -.059 | -.0011 | .0082 | -.0175 | .0001 | -.0008 | -.0095 |
| | -.019 | -.0003 | .0067 | -.0058 | .0000 | -.0007 | -.0098 |
| | .0001 | -.0000 | .0064 | .0004 | .0001 | -.0006 | -.0100 |
| | .0021 | .0001 | .0064 | .0073 | .0000 | -.0006 | -.0101 |
| | .0060 | .0008 | .0072 | .0192 | .0000 | -.0008 | -.0098 |
| | .0100 | .0021 | .0097 | .0310 | .0001 | -.0011 | -.0097 |
| | .0140 | .0039 | .0149 | .0441 | .0000 | -.0014 | -.0100 |
| | .0180 | .0063 | .0246 | .0571 | .0001 | -.0013 | -.0110 |
| 0.90 | -.059 | -.0010 | .0078 | -.0180 | .0000 | -.0008 | -.0097 |
| | -.020 | -.0003 | .0064 | -.0054 | .0000 | -.0007 | -.0101 |
| | .0001 | -.0002 | .0064 | .0015 | .0000 | -.0006 | -.0102 |
| | .0019 | .0000 | .0061 | .0071 | .0001 | -.0006 | -.0102 |
| | .0059 | .0010 | .0073 | .0188 | .0000 | -.0008 | -.0100 |
| | .0100 | .0023 | .0102 | .0315 | .0001 | -.0011 | -.0101 |
| | .0139 | .0041 | .0159 | .0447 | .0001 | -.0015 | -.0104 |
| | .0181 | .0066 | .0256 | .0613 | .0001 | -.0015 | -.0114 |
| 0.95 | -.059 | -.0017 | .0103 | -.0160 | -.0001 | -.0008 | -.0097 |
| | -.019 | -.0008 | .0066 | -.0034 | -.0001 | -.0005 | -.0103 |
| | .0001 | -.0004 | .0074 | .0024 | -.0001 | -.0006 | -.0102 |
| | .0022 | -.0005 | .0078 | .0106 | -.0001 | -.0006 | -.0101 |
| | .0061 | .0003 | .0074 | .0228 | -.0000 | -.0007 | -.0100 |
| | .0101 | .0018 | .0114 | .0353 | -.0001 | -.0011 | -.0100 |
| | .0140 | .0039 | .0168 | .0495 | -.0000 | -.0014 | -.0106 |
| | .0181 | .0066 | .0270 | .0664 | -.0000 | -.0013 | -.0120 |
| 1.00 | -.058 | -.0015 | .0133 | -.0154 | -.0000 | -.0009 | -.0096 |
| | -.019 | -.0005 | .0077 | -.0043 | .0000 | -.0006 | -.0105 |
| | .0001 | -.0000 | .0108 | .0013 | .0000 | -.0005 | -.0108 |
| | .0020 | .0001 | .0089 | .0086 | .0001 | -.0005 | -.0108 |
| | .0061 | .0010 | .0109 | .0218 | .0001 | -.0007 | -.0106 |
| | .0100 | .0023 | .0124 | .0344 | .0002 | -.0011 | -.0105 |
| | .0140 | .0046 | .0201 | .0475 | .0001 | -.0014 | -.0108 |
| | .0181 | .0071 | .0323 | .0647 | .0001 | -.0013 | -.0125 |
| 1.05 | -.059 | -.0017 | .0133 | -.0162 | -.0001 | -.0009 | -.0092 |
| | -.019 | -.0008 | .0114 | -.0033 | -.0000 | -.0008 | -.0095 |
| | .0003 | -.0008 | .0107 | .0045 | -.0001 | -.0007 | -.0095 |
| | .0021 | -.0006 | .0108 | .0107 | -.0001 | -.0008 | -.0095 |
| | .0061 | .0005 | .0121 | .0224 | -.0001 | -.0010 | -.0093 |
| | .0101 | .0028 | .0150 | .0347 | -.0001 | -.0013 | -.0094 |
| | .0140 | .0041 | .0207 | .0497 | -.0001 | -.0017 | -.0098 |
| | .0180 | .0069 | .0316 | .0663 | -.0000 | -.0017 | -.0110 |
| 1.10 | -.019 | -.0008 | .0100 | -.0032 | -.0000 | -.0006 | -.0100 |
| | .0002 | -.0004 | .0109 | .0029 | -.0000 | -.0005 | -.0102 |
| | .0021 | -.0005 | .0111 | .0105 | -.0000 | -.0006 | -.0099 |
| | .0061 | .0005 | .0119 | .0217 | -.0000 | -.0009 | -.0097 |
| | .0102 | .0023 | .0158 | .0336 | -.0000 | -.0011 | -.0100 |
| | .0141 | .0043 | .0219 | .0466 | .0001 | -.0014 | -.0108 |
| | .0180 | .0071 | .0337 | .0626 | .0000 | -.0013 | -.0127 |
| 1.30 | -.061 | -.0012 | .0106 | -.0189 | .0000 | -.0010 | -.0097 |
| | -.033 | -.0002 | .0073 | -.0067 | .0000 | -.0007 | -.0101 |
| | .0001 | .0001 | .0087 | .0002 | .0000 | -.0007 | -.0102 |
| | .0020 | .0002 | .0086 | .0065 | .0000 | -.0007 | -.0101 |
| | .0060 | .0012 | .0097 | .0189 | .0001 | -.0010 | -.0099 |
| | .0101 | .0026 | .0130 | .0326 | .0001 | -.0014 | -.0102 |
| | .0140 | .0048 | .0204 | .0483 | .0001 | -.0018 | -.0108 |
| | .0180 | .0076 | .0325 | .0678 | .0001 | -.0020 | -.0121 |
| 1.70 | -.061 | -.0016 | .0116 | -.0193 | .0000 | -.0013 | -.0105 |
| | -.020 | -.0005 | .0096 | -.0066 | .0000 | -.0010 | -.0107 |
| | .0001 | -.0001 | .0092 | .0000 | .0000 | -.0009 | -.0109 |
| | .0020 | .0001 | .0090 | .0072 | .0000 | -.0009 | -.0109 |
| | .0059 | .0018 | .0104 | .0197 | .0000 | -.0011 | -.0112 |
| | .0101 | .0030 | .0145 | .0349 | .0001 | -.0015 | -.0121 |
| | .0140 | .0059 | .0239 | .0538 | .0001 | -.0019 | -.0137 |
| | .0180 | .0103 | .0427 | .0808 | .0001 | -.0025 | -.0157 |
| 1.90 | -.060 | -.0018 | .0110 | -.0177 | -.0000 | -.0014 | -.0101 |
| | -.019 | -.0007 | .0085 | -.0045 | -.0000 | -.0011 | -.0103 |
| | .0001 | -.0004 | .0087 | .0022 | .0000 | -.0010 | -.0104 |
| | .0021 | -.0001 | .0086 | .0093 | -.0000 | -.0010 | -.0104 |
| | .0061 | .0012 | .0101 | .0219 | .0000 | -.0013 | -.0106 |
| | .0101 | .0033 | .0147 | .0377 | .0000 | -.0018 | -.0115 |
| | .0140 | .0067 | .0261 | .0584 | .0000 | -.0025 | -.0135 |
| | .0179 | .0110 | .0452 | .0826 | .0001 | -.0031 | -.0154 |
| 2.22 | -.059 | -.0019 | .0109 | -.0185 | -.0000 | -.0015 | -.0104 |
| | -.020 | -.0007 | .0088 | -.0049 | -.0000 | -.0012 | -.0106 |
| | .0001 | -.0004 | .0084 | .0023 | -.0000 | -.0011 | -.0106 |
| | .0020 | .0001 | .0085 | .0092 | -.0000 | -.0011 | -.0107 |
| | .0060 | .0014 | .0102 | .0233 | -.0000 | -.0015 | -.0110 |
| | .0101 | .0039 | .0156 | .0410 | -.0000 | -.0022 | -.0120 |
| | .0140 | .0077 | .0288 | .0619 | .0000 | -.0031 | -.0133 |
| | .0179 | .0122 | .0501 | .0829 | .0001 | -.0039 | -.0139 |



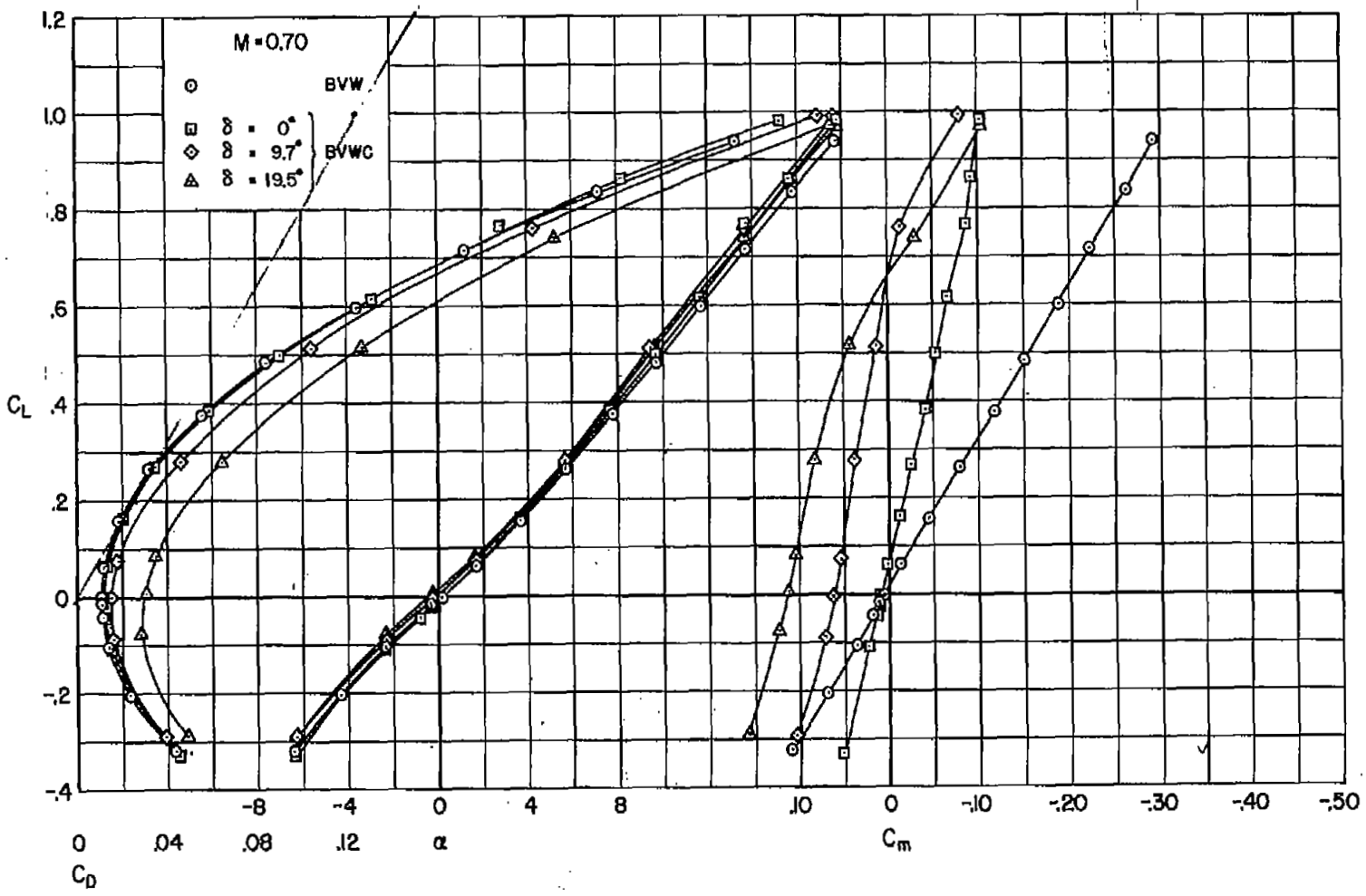

(a) Dimensional sketch of complete model.

Figure 1.- Model details and dimensions.



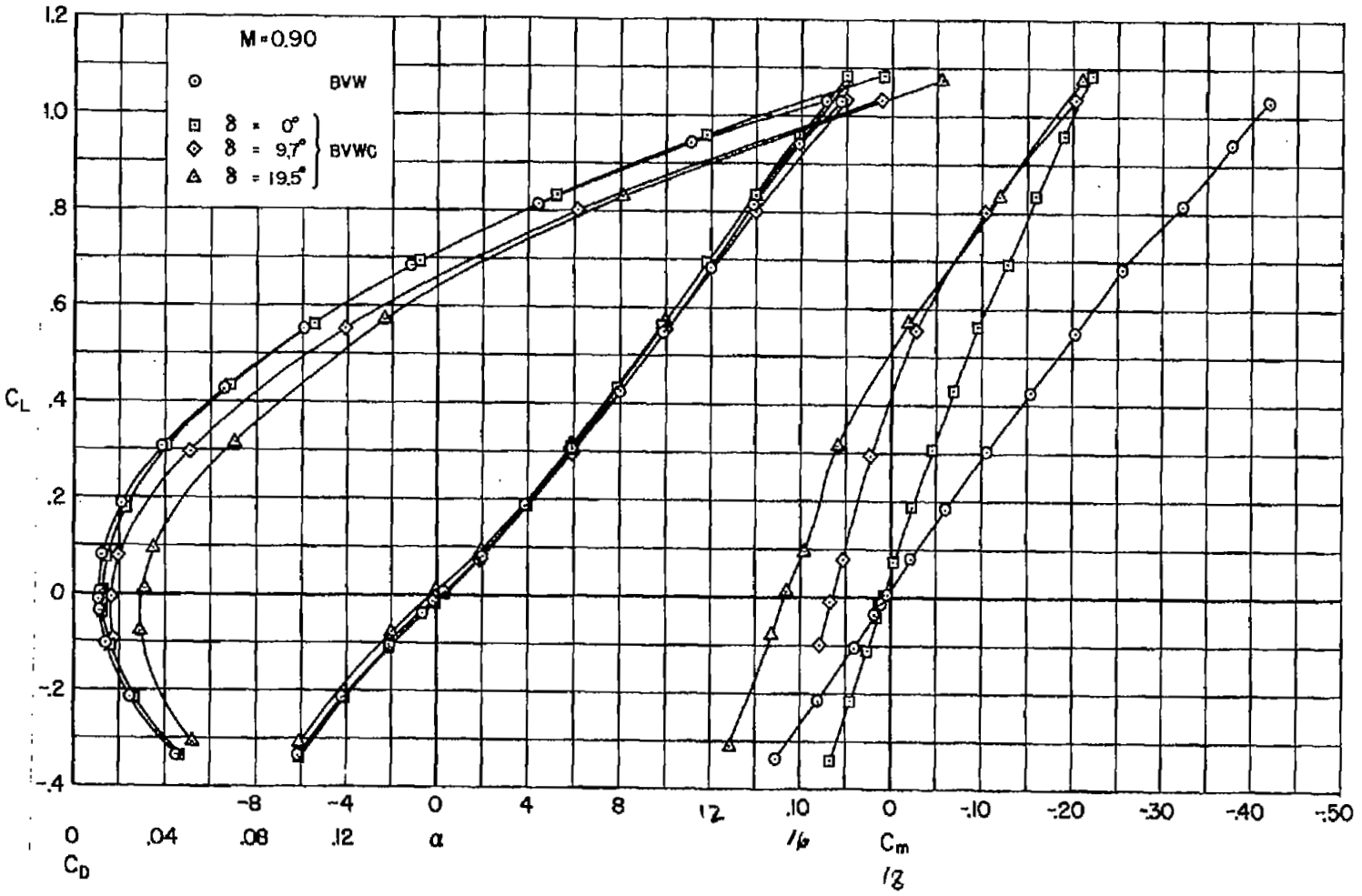

(b) Details of canard.

Figure 1.- Concluded.



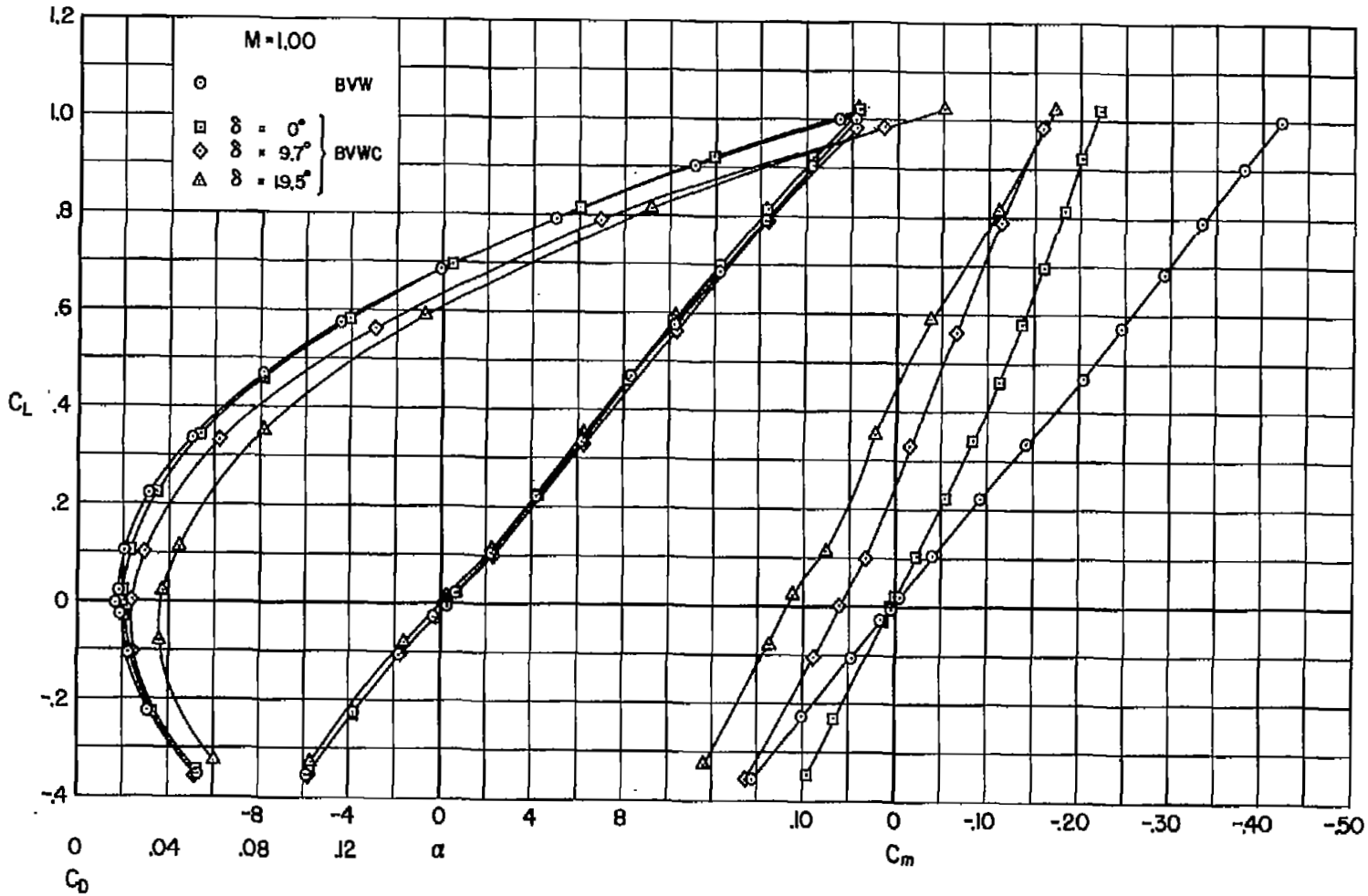

(a) M = 0.70

Figure 2.- Lift, drag, and pitching-moment characteristics with the canard on at constant deflection angles and with the canard off.



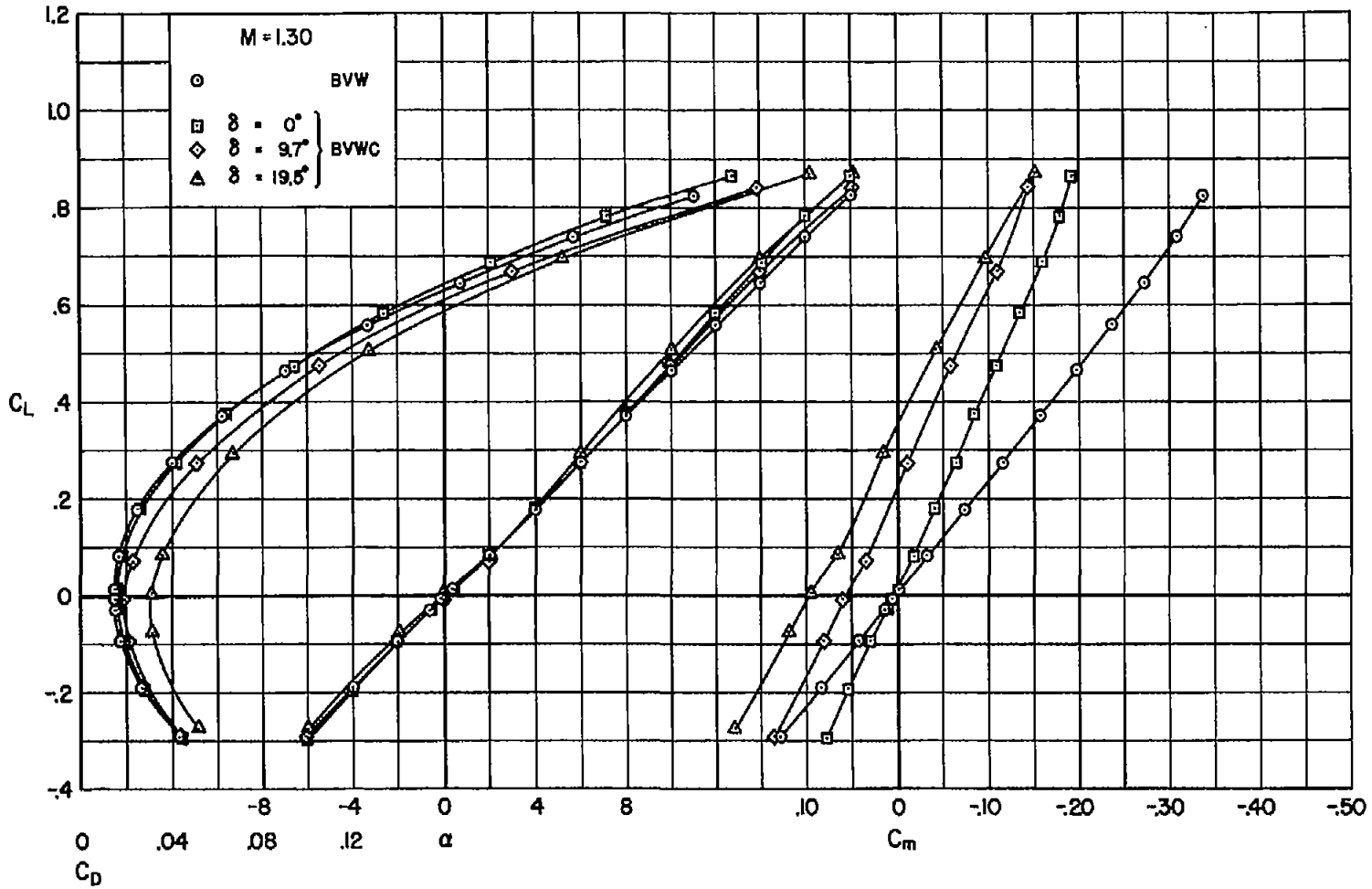

(b) M = 0.90

Figure 2.- Continued.



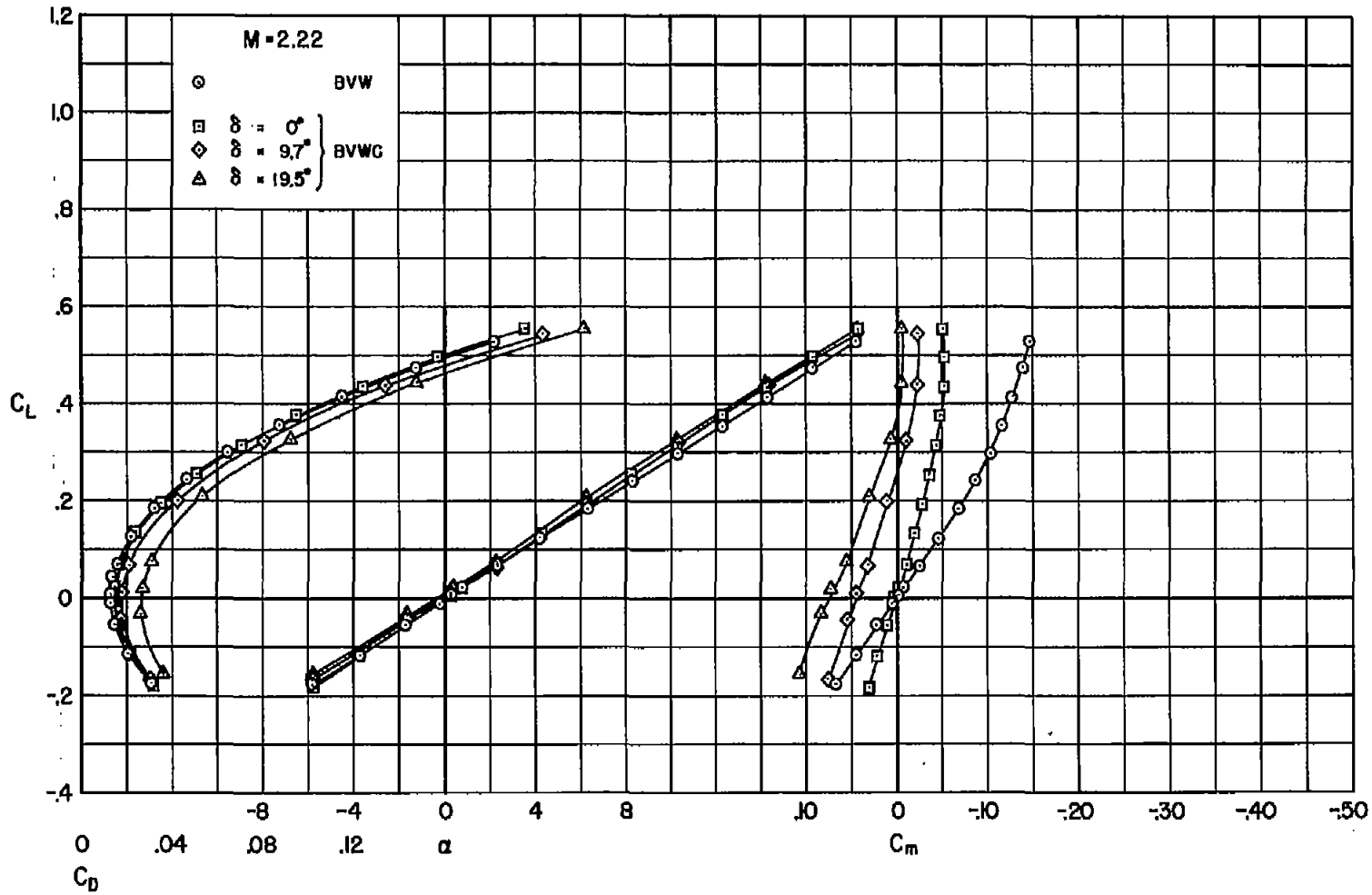

(c) M = 1.00

Figure 2.- Continued.



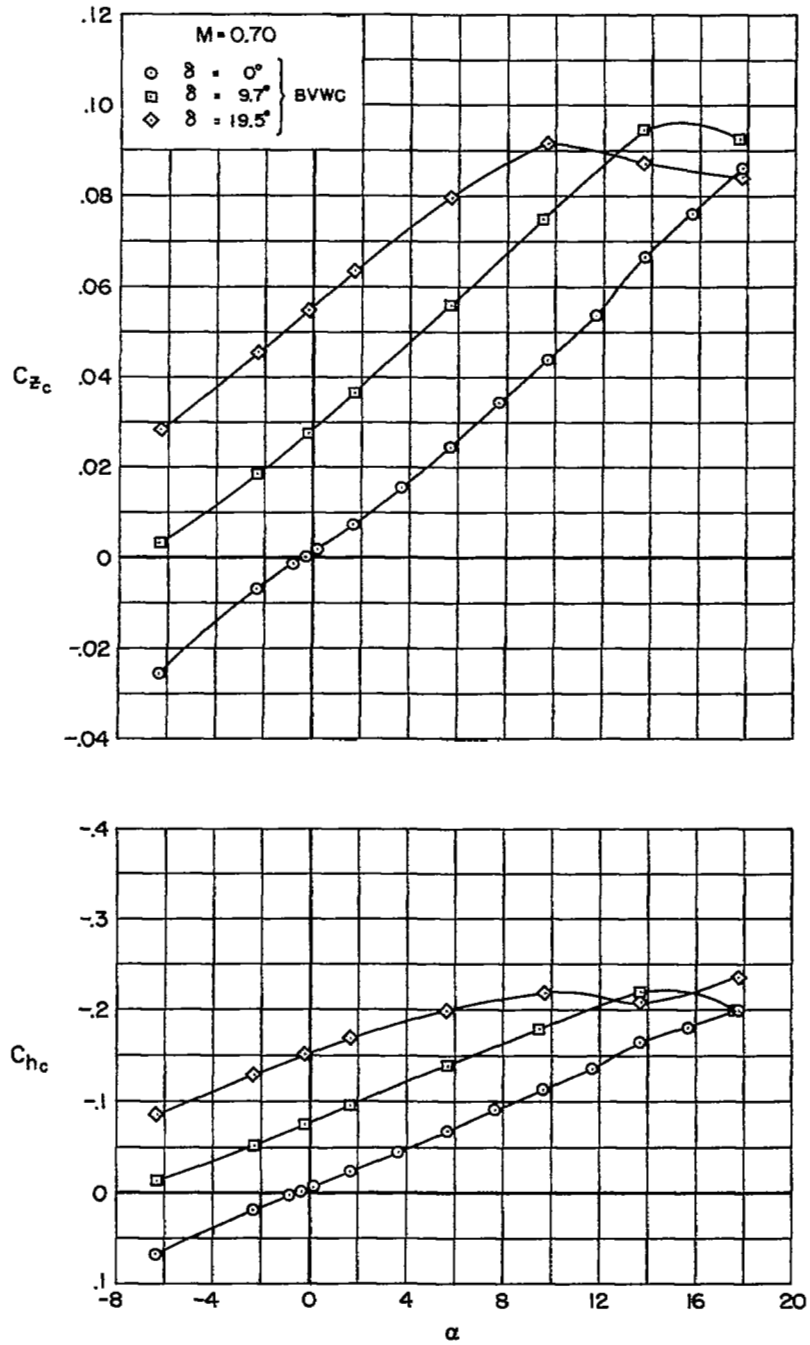

(d) M = 1.30

Figure 2.- Continued.



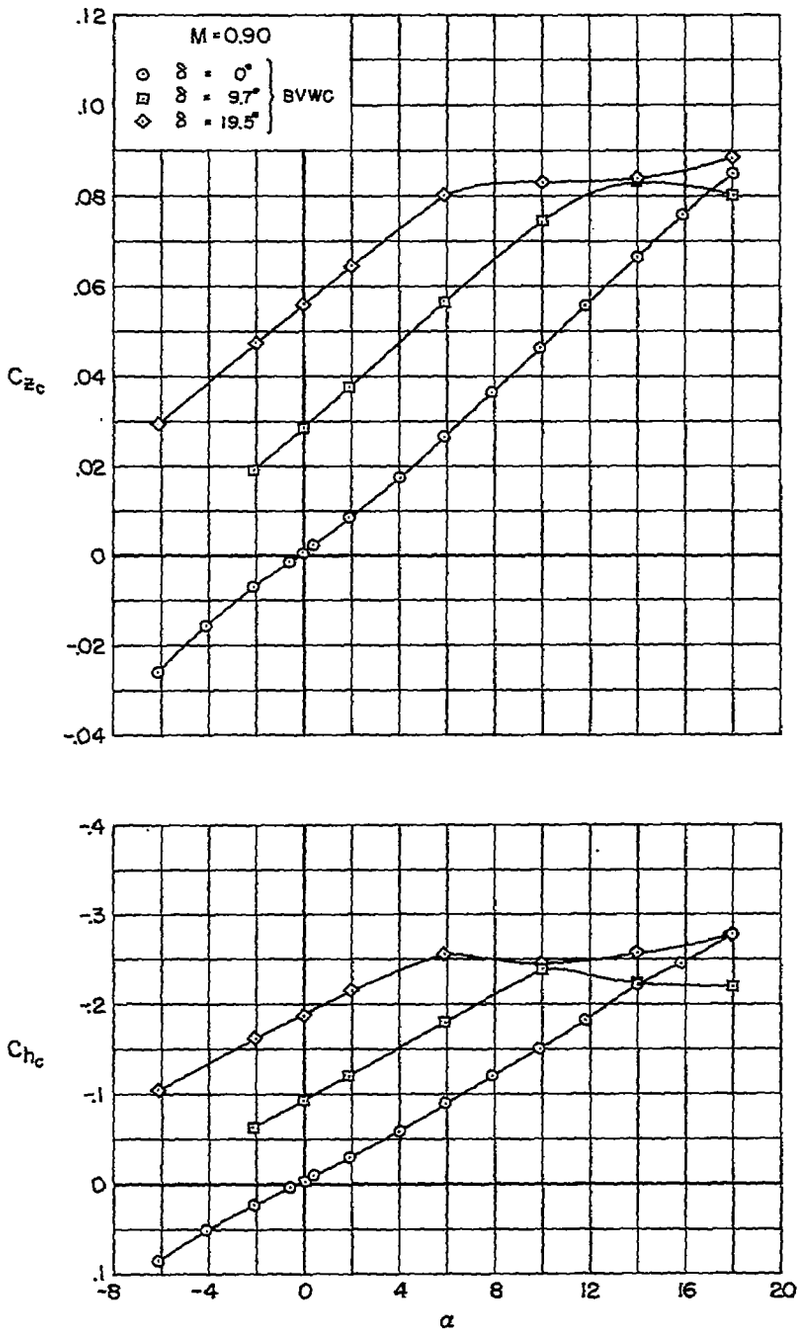

(e) M = 2.22

Figure 2.- Concluded.



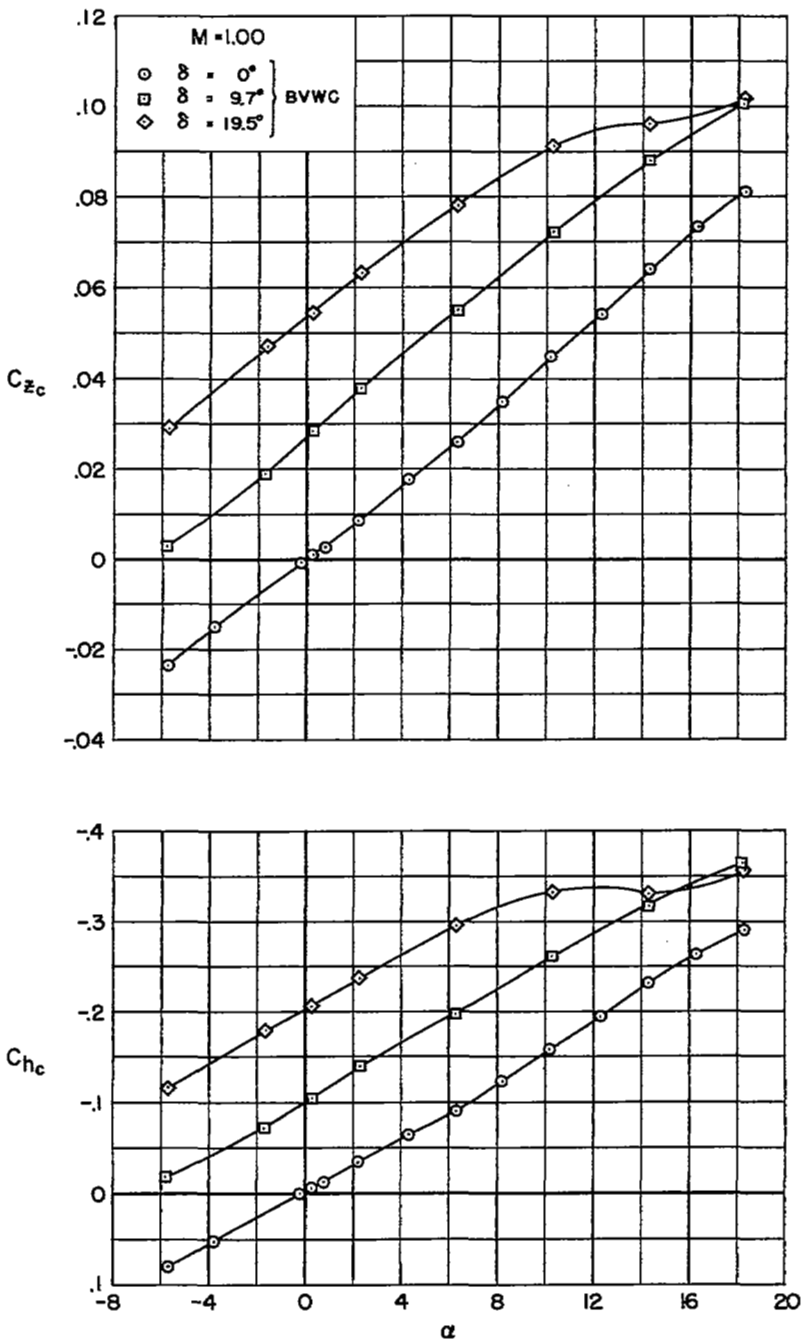

(a) M = 0.70

Figure 3.- Variations of canard normal-force and hinge-moment coefficients as a function of angle of attack at constant deflection angles.



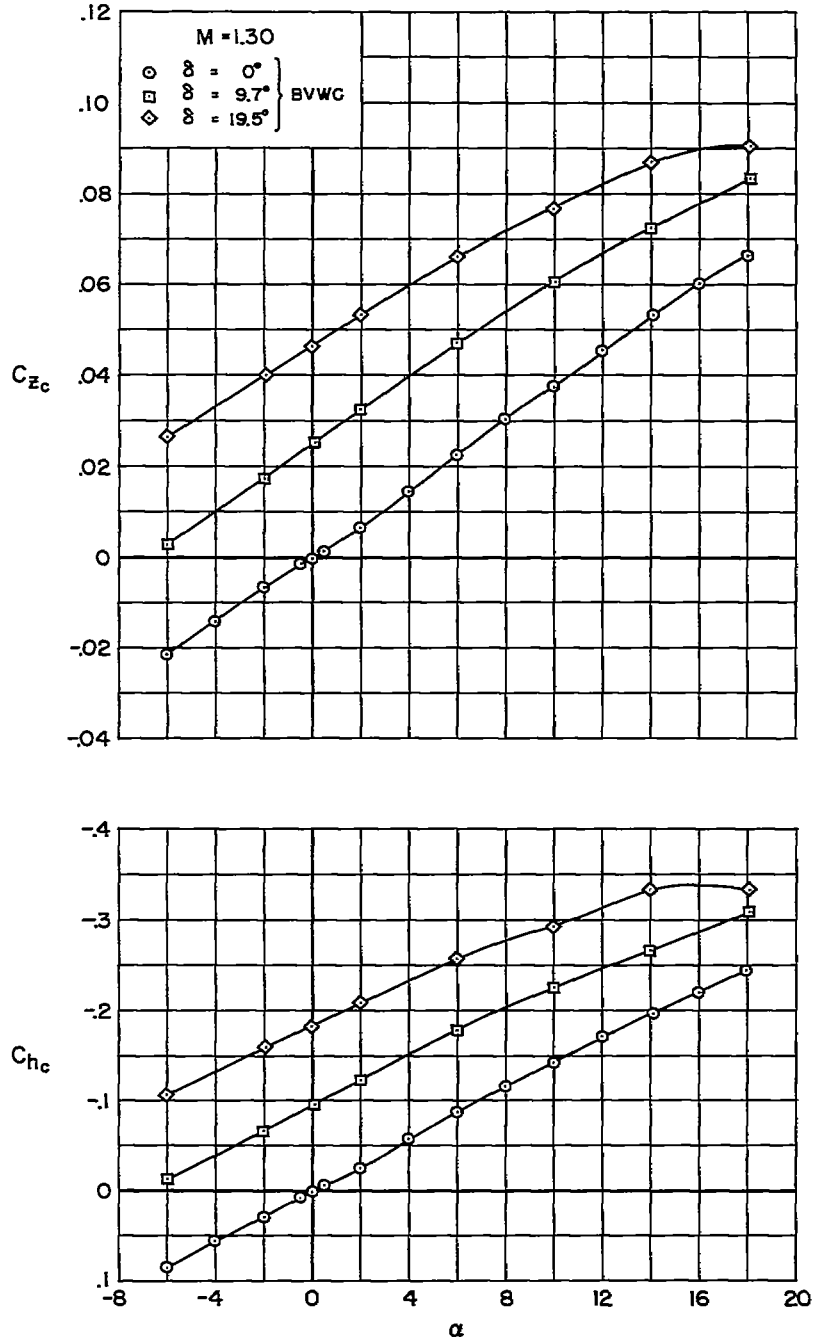

(b) M = 0.90

Figure 3.- Continued.



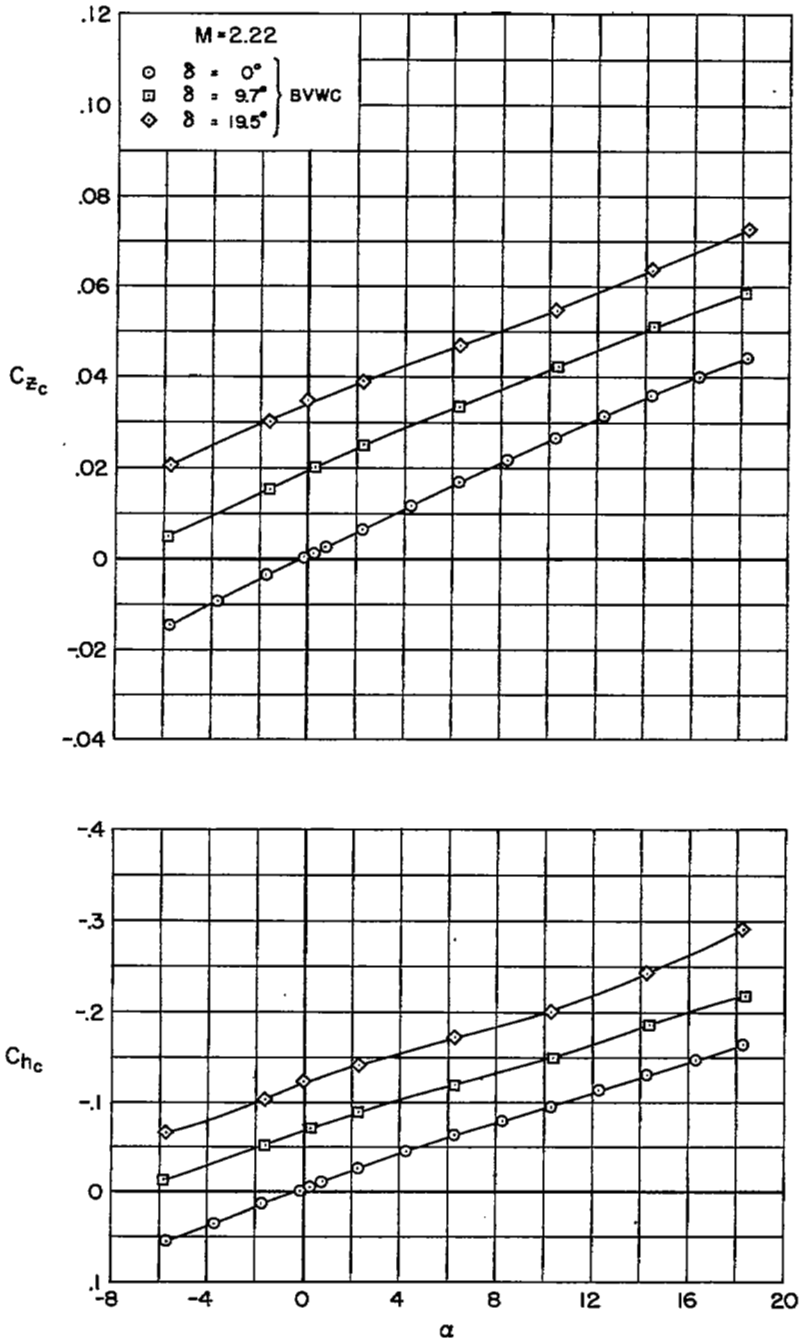

(c) M = 1.00

Figure 3.- Continued.




(d) M = 1.30

Figure 3.- Continued.




(e) M = 2.22

Figure 3.- Concluded.

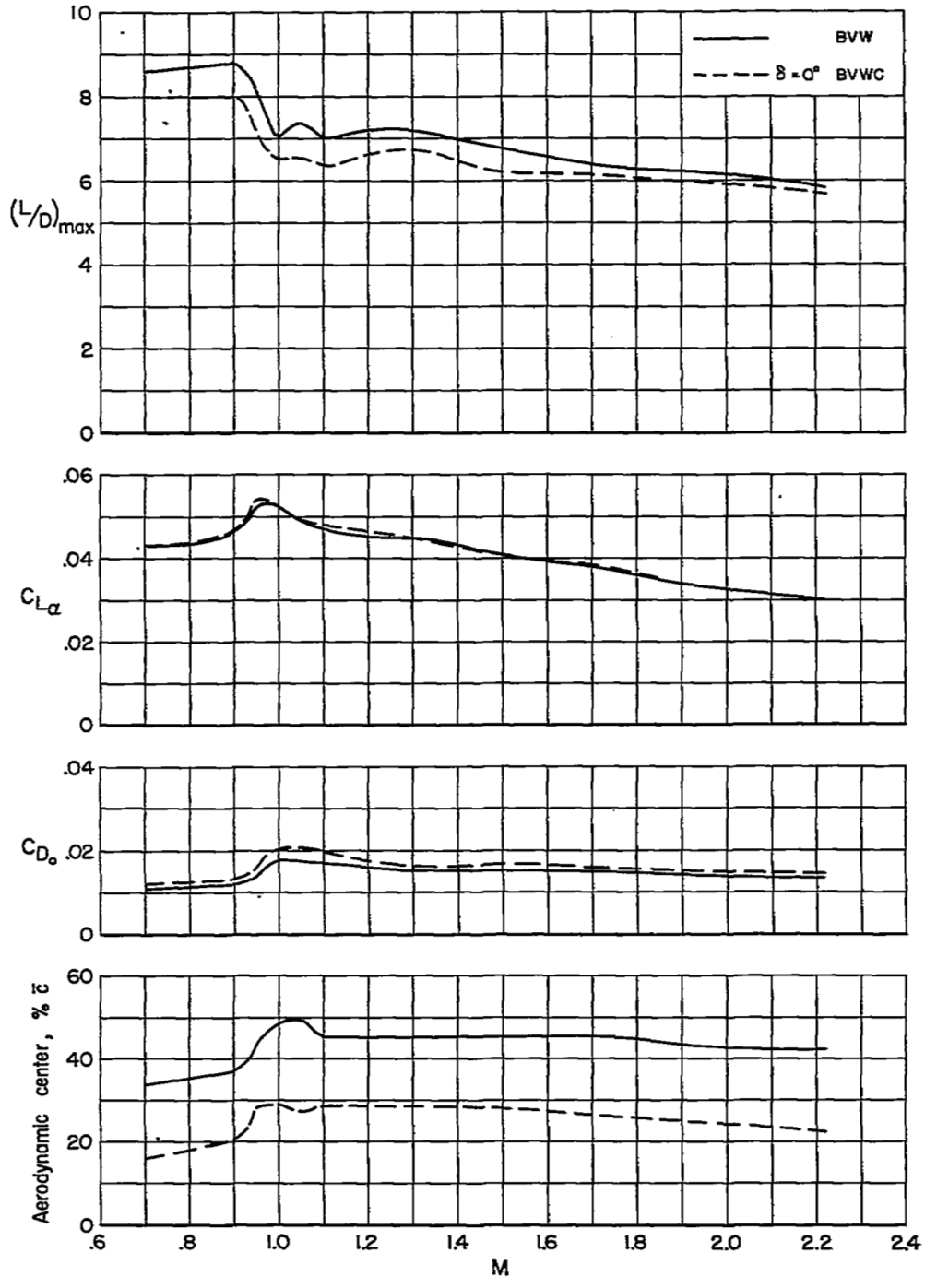
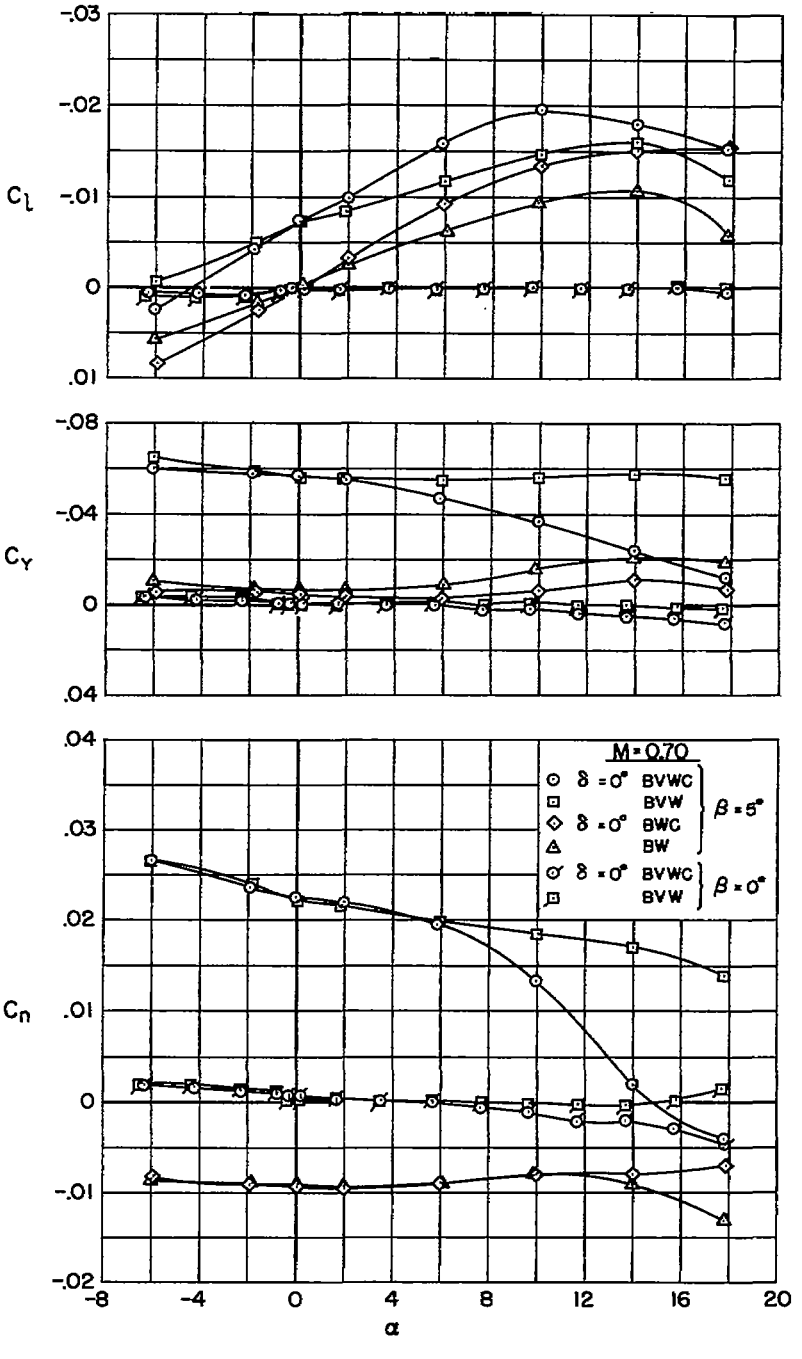
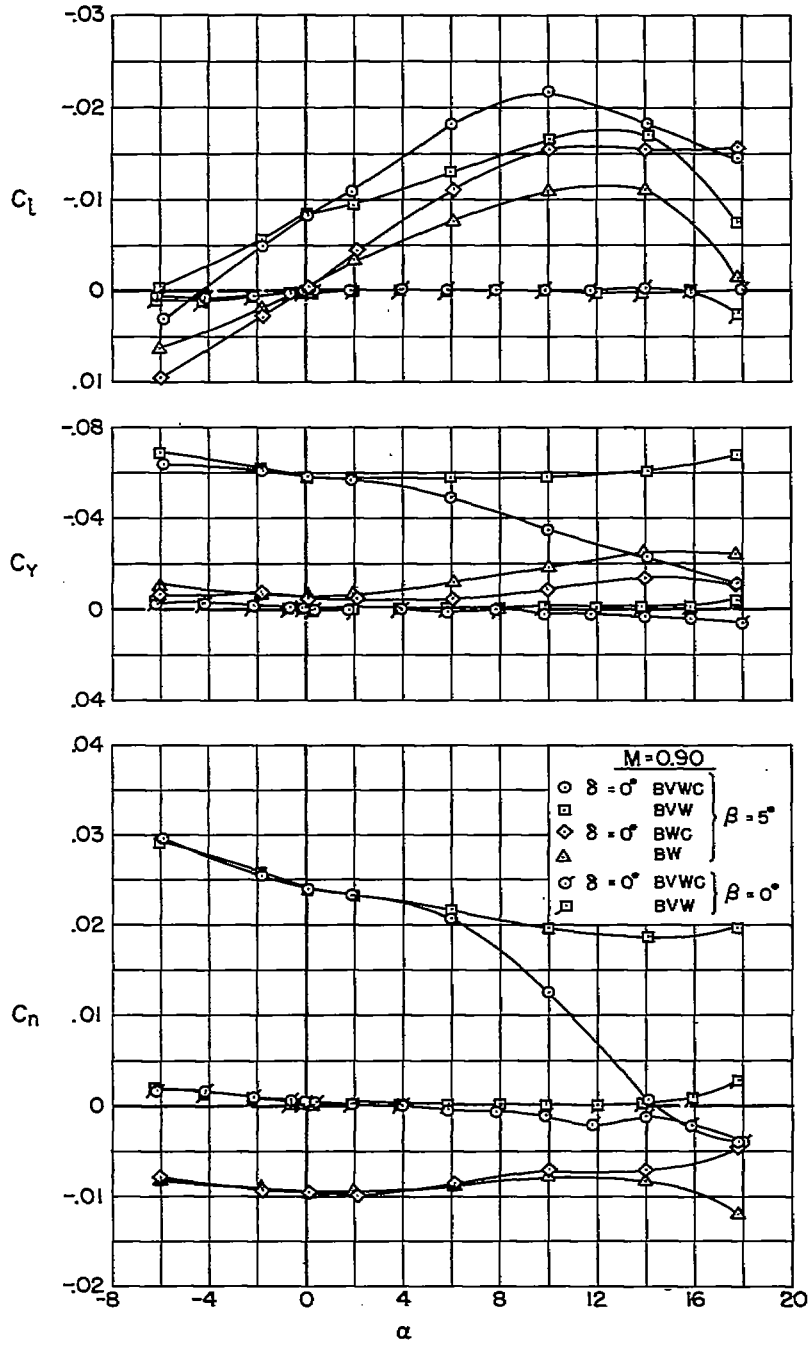



Figure 4.- Variation of maximum lift-drag ratios, lift-curve slopes, minimum drag coefficients, and aerodynamic centers as a function of Mach number with the canard on and off.



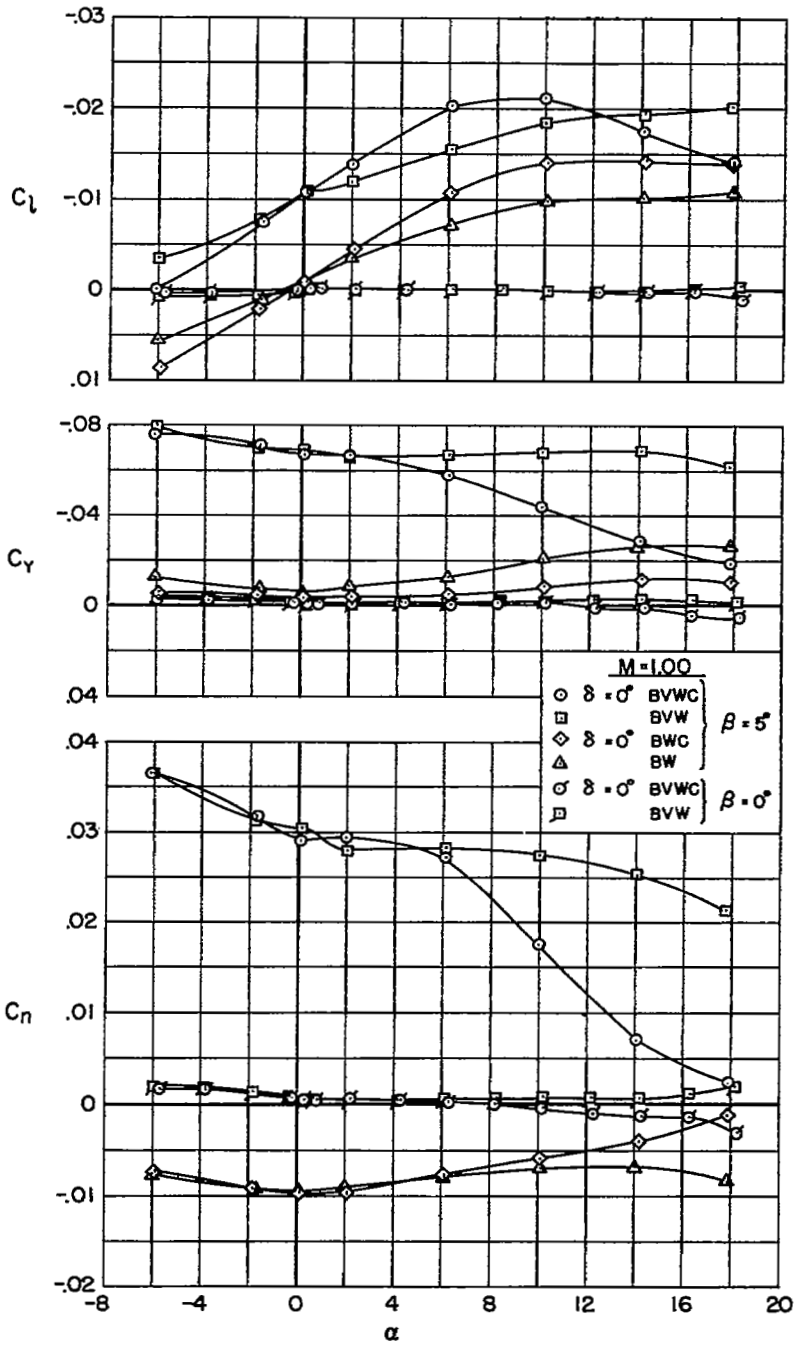

(a) M = 0.70

Figure 5.- The effect of configuration changes on the lateral-directional stability characteristics as a function of angle of attack at constant sideslip angles.



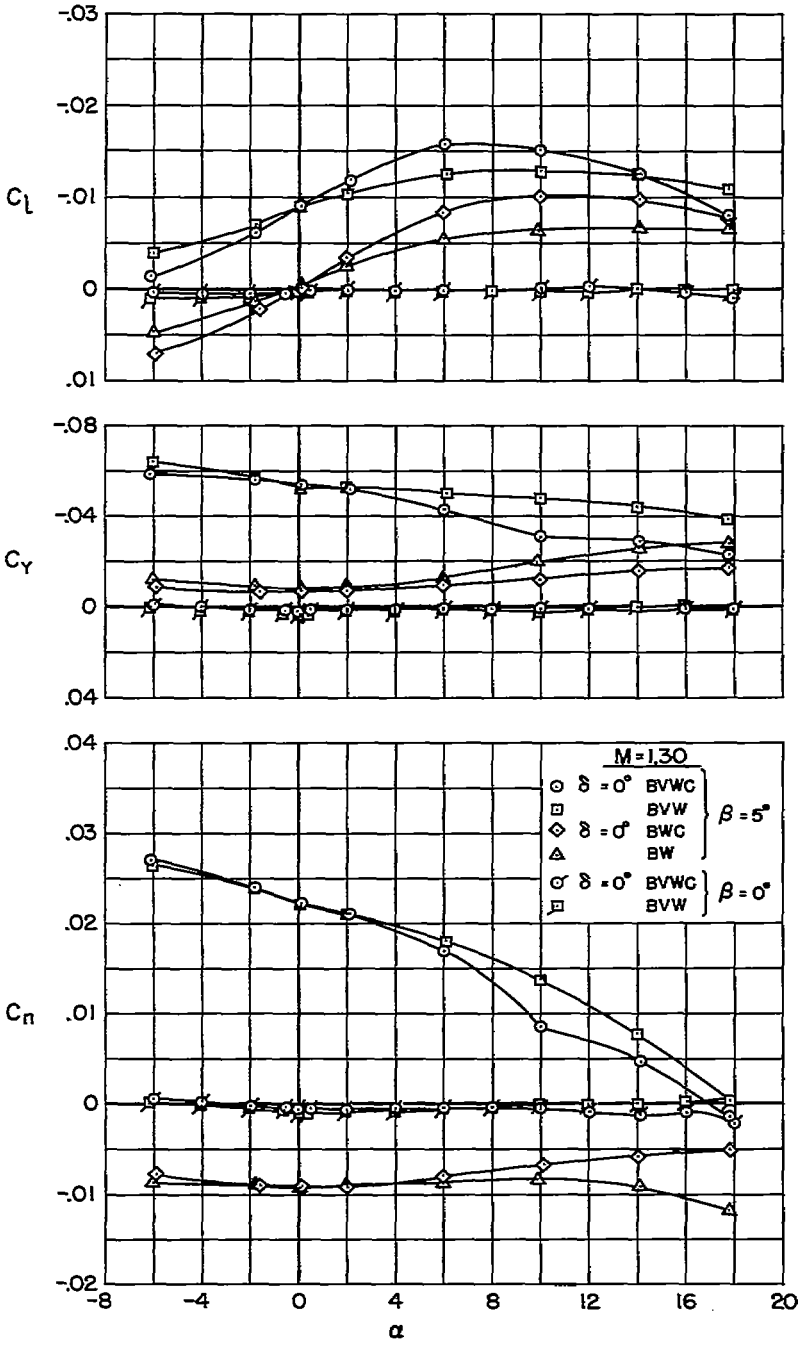

(b) M = 0.90

Figure 5.- Continued.



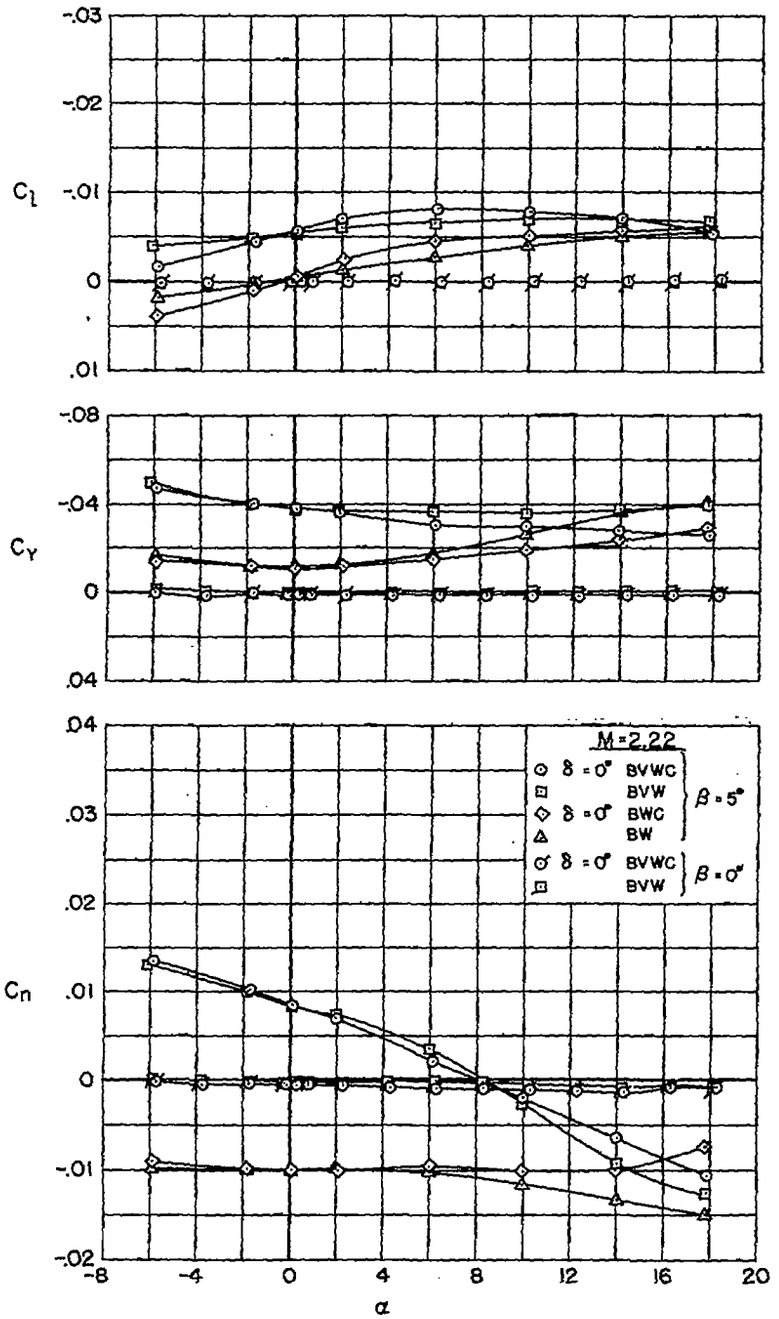

(c) M = 1.00

Figure 5.- Continued.



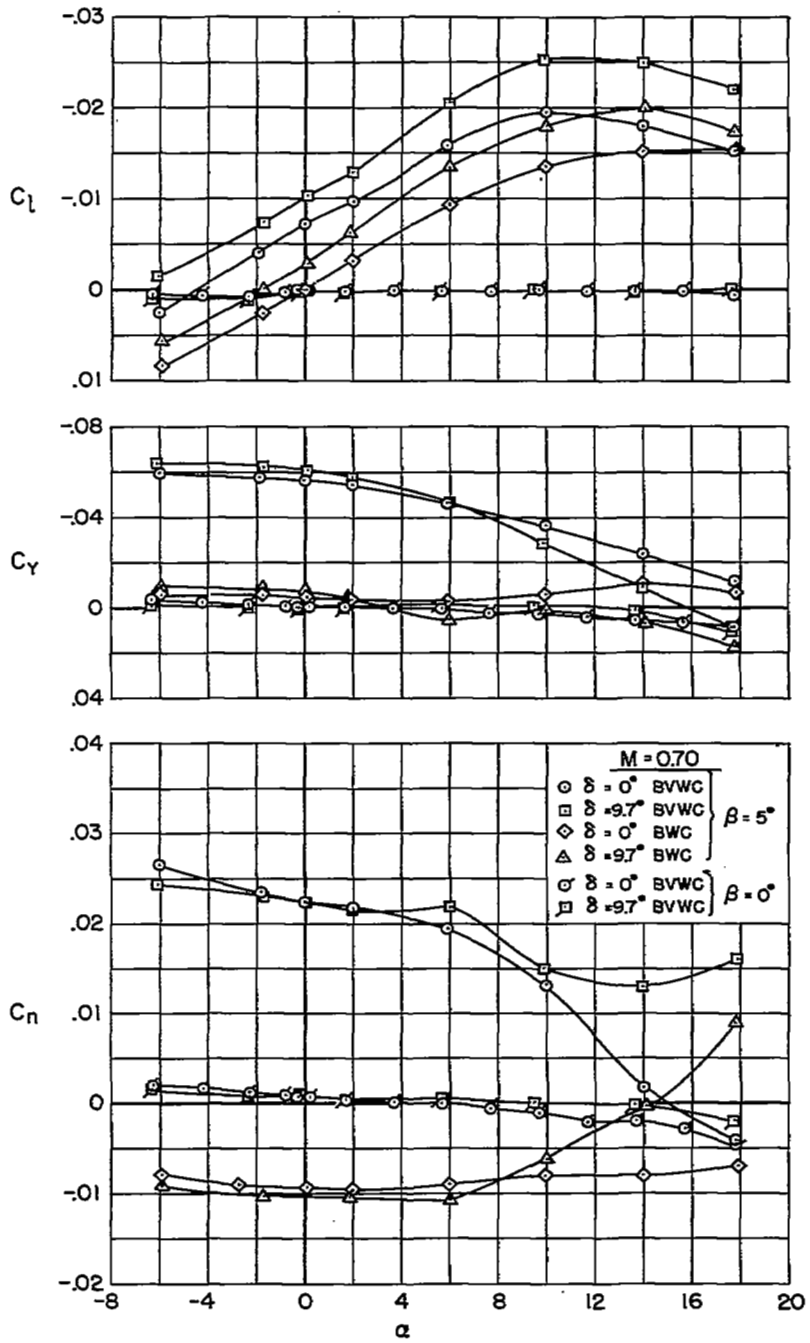

(d) M = 1.30

Figure 5.- Continued.




(e) M = 2.22

Figure 5.- Concluded.




(a) M = 0.70

Figure 6.- The effect of canard deflection on the lateral-directional characteristics with the vertical tail on and off as a function of angle of attack at constant sideslip angles.

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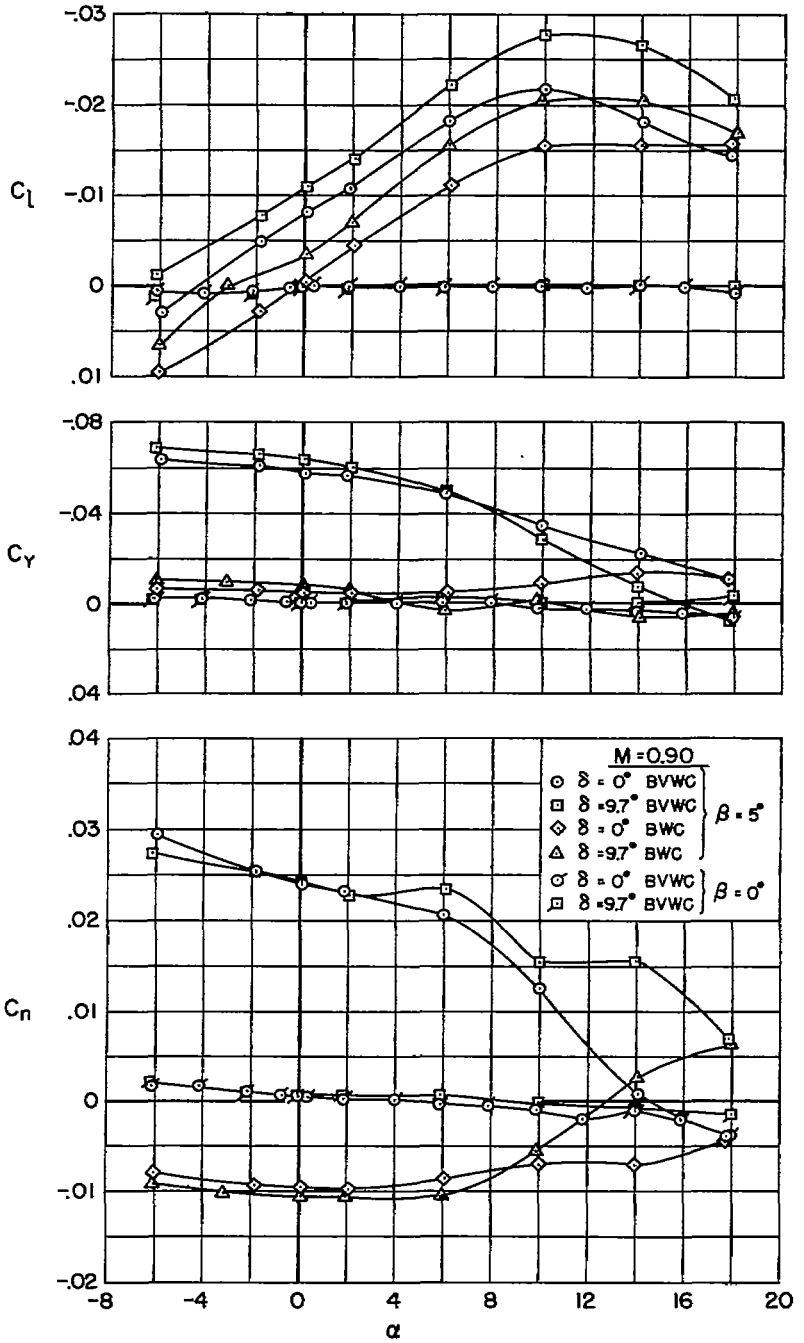
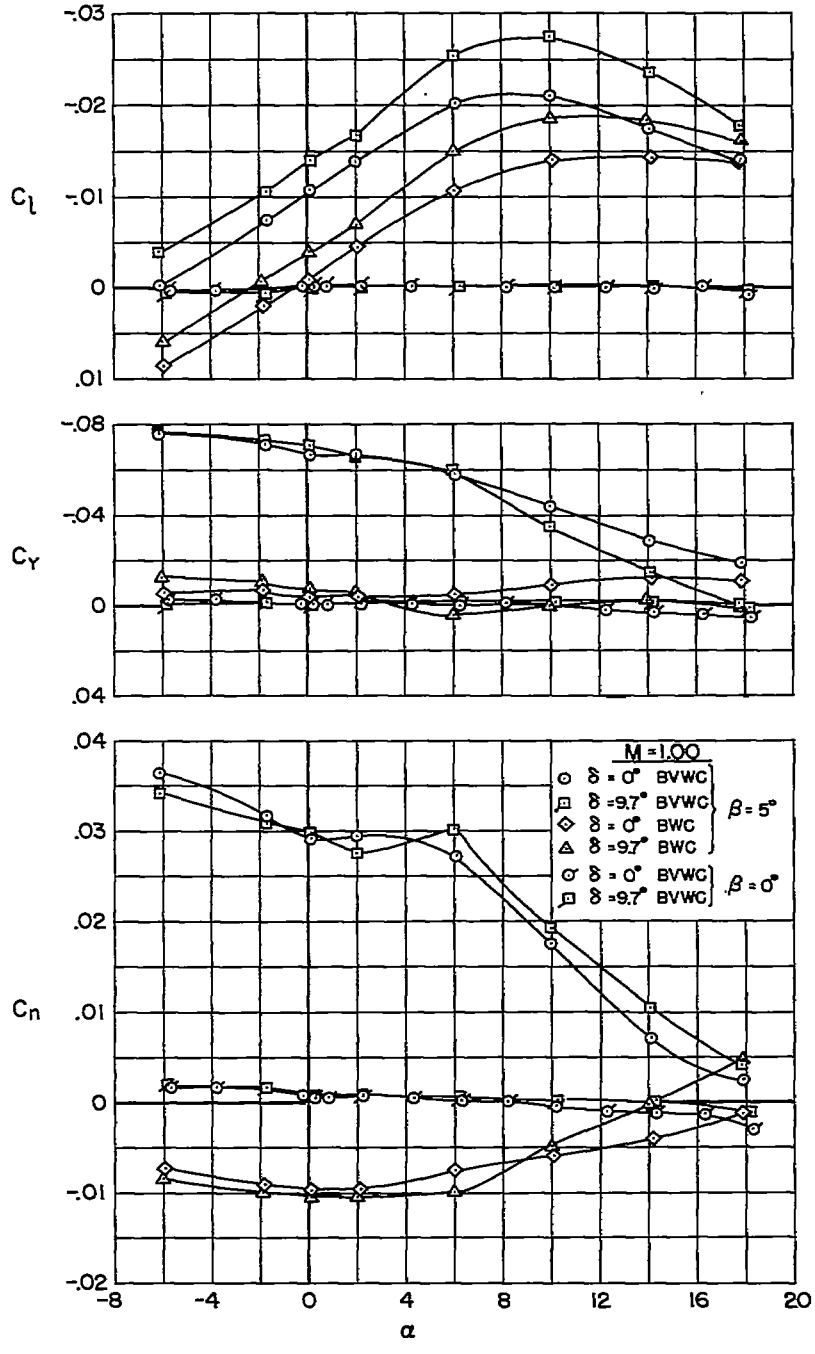


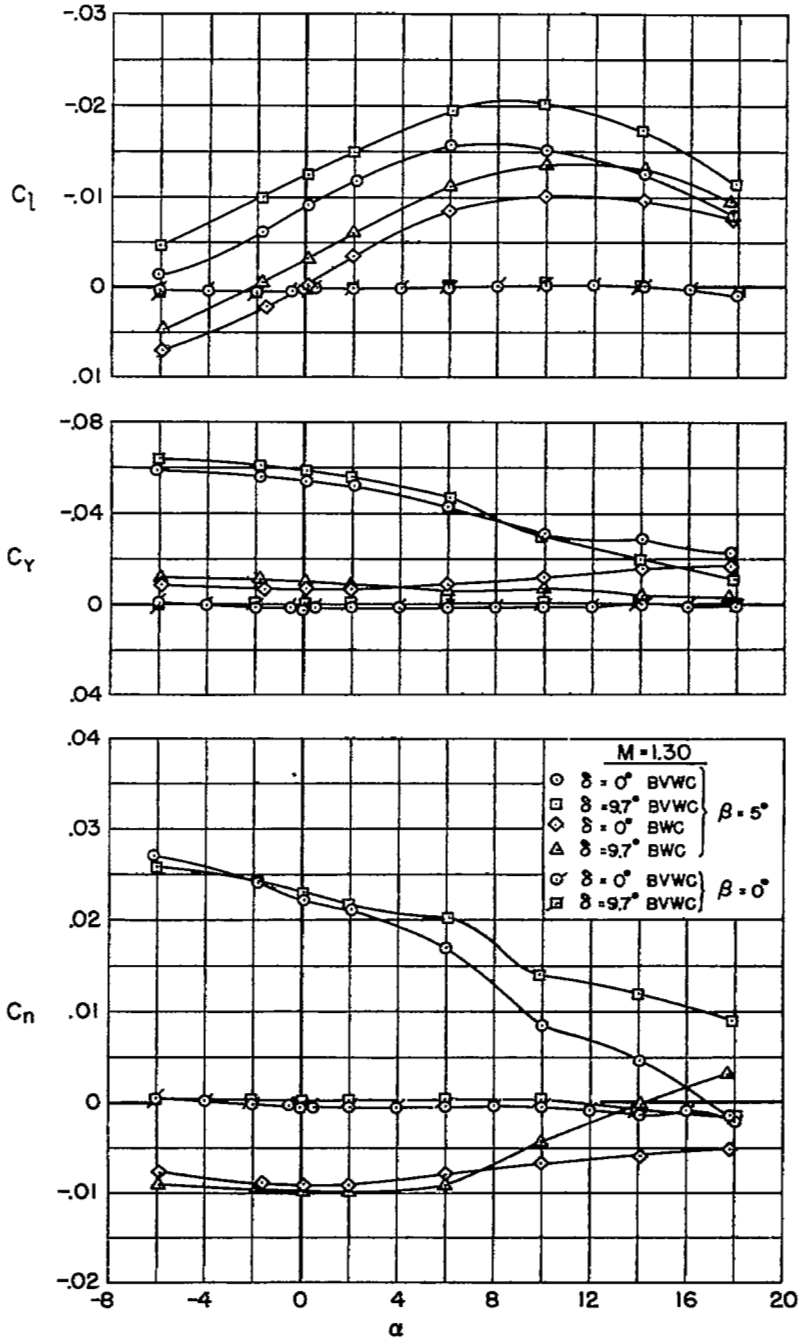

(b) M = 0.90

Figure 6.- Continued.



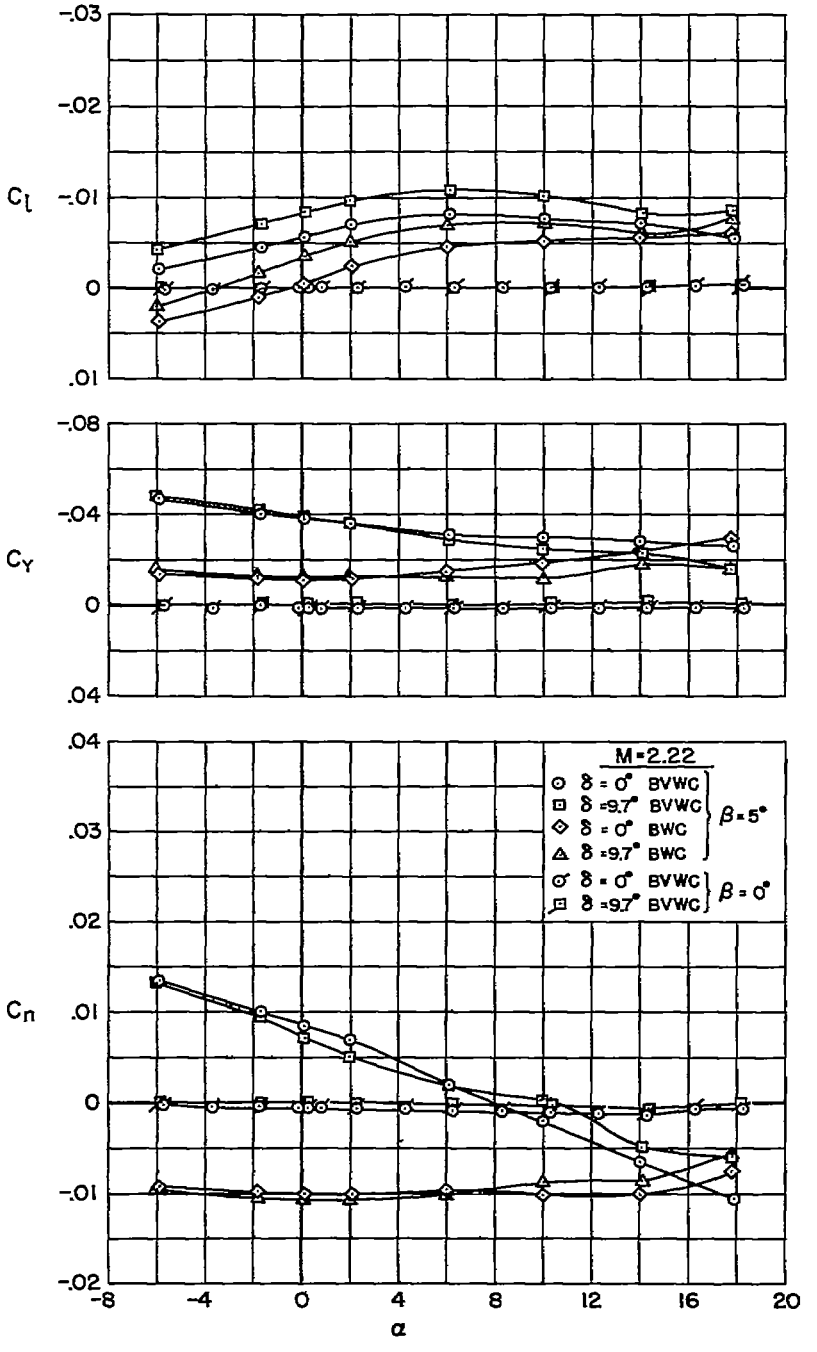

(c) M = 1.00

Figure 6.- Continued.



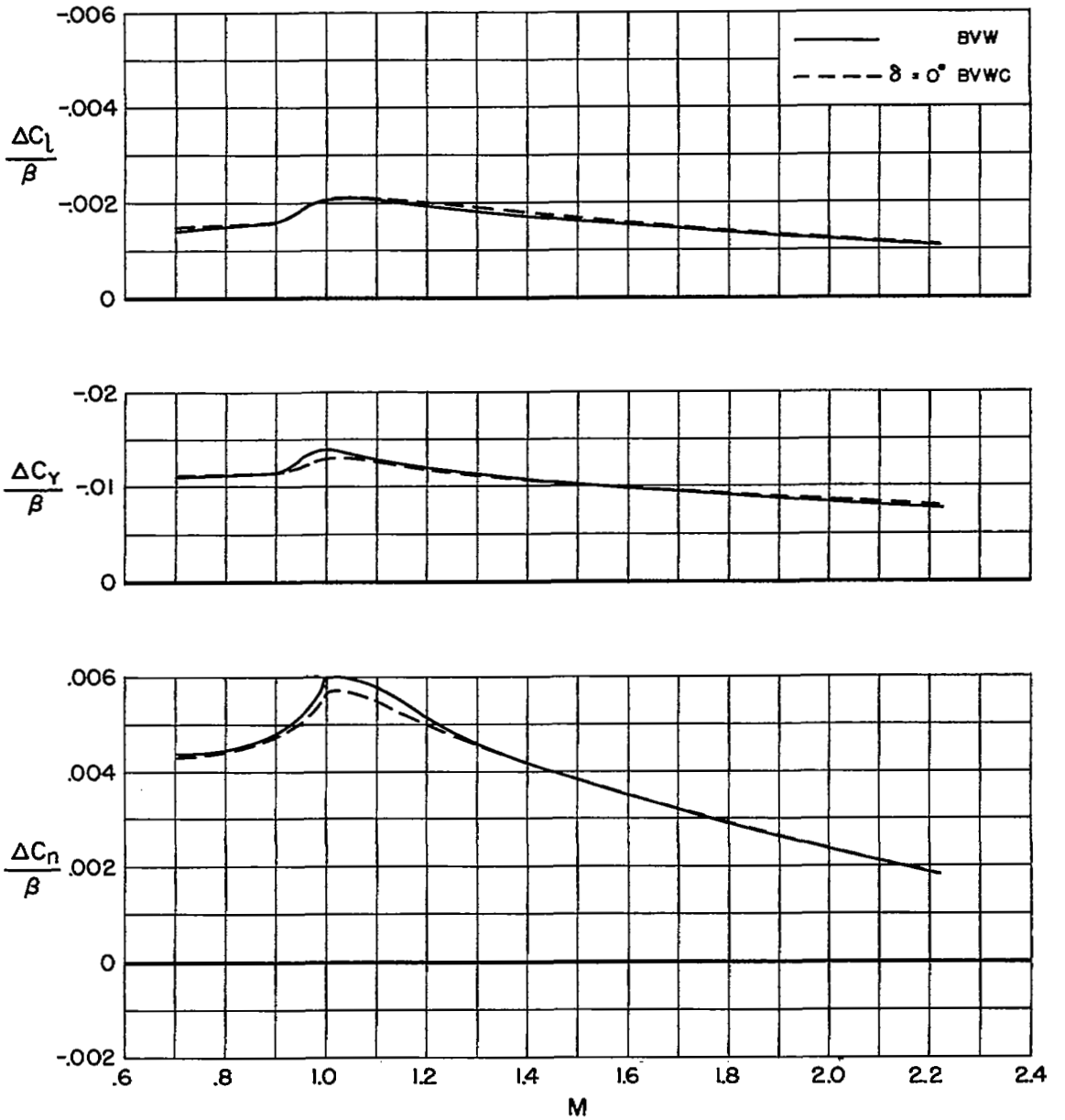

(d) M = 1.30

Figure 6.- Continued.



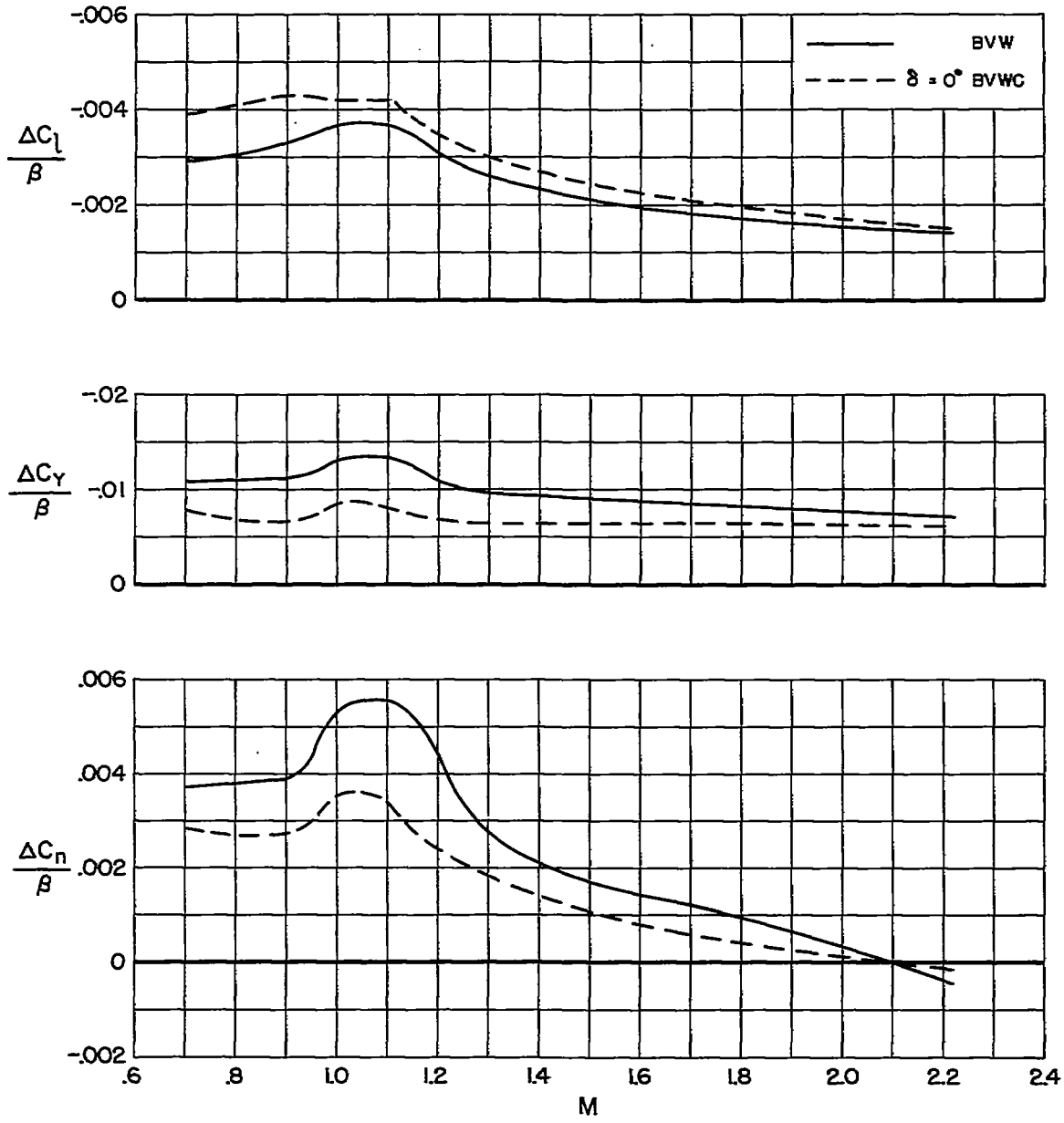

(e) M = 2.22

Figure 6.- Concluded.



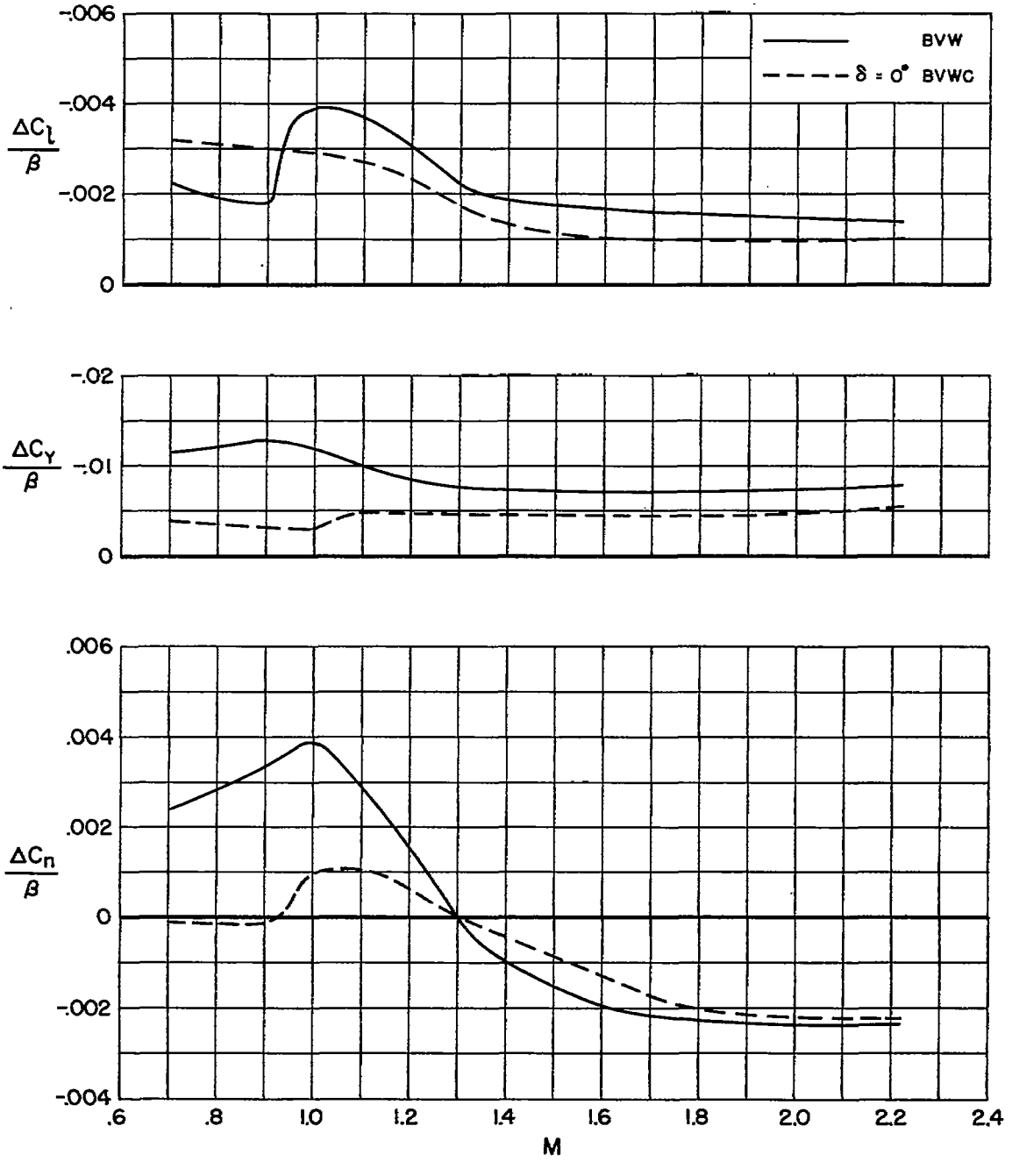

(a) $\alpha = 0^\circ$

Figure 7.- Variation of $\Delta C_l/\beta$, $\Delta C_Y/\beta$, and $\Delta C_n/\beta$ as a function of Mach number at constant angles of attack with the canard on and off with the vertical tail on.




(b) $\alpha = 10^\circ$

Figure 7.- Continued.




(c) $\alpha = 18^{\circ}$

Figure 7.- Concluded.



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